

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

6B
1272
28

Issued August 15, 1910.

U. S. DEPARTMENT OF AGRICULTURE,

OFFICE OF EXPERIMENT STATIONS—BULLETIN 228.

A. C. TRUE, Director.

PROCEEDINGS

OF THE TWENTY-THIRD ANNUAL CONVENTION
OF THE ASSOCIATION OF

AMERICAN AGRICULTURAL COLLEGES AND
EXPERIMENT STATIONS

HELD AT

PORTLAND, OREG., AUGUST 18-20, 1909.

Edited by

A. C. TRUE AND W. H. BEAL,

FOR THE OFFICE OF EXPERIMENT STATIONS,

and

W. O. THOMPSON,

FOR THE EXECUTIVE COMMITTEE OF THE ASSOCIATION.



WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1910.

THE AGRICULTURAL COLLEGES.

- ALABAMA—*Auburn*: Charles C. Thach.^a
Normal: W. S. Buchanan.^a *Tuskegee*: Booker T. Washington.^b
- ARIZONA—*Tucson*: Kendrick C. Babcock.^a
- ARKANSAS—*Fayetteville*: C. F. Adams.^c
- CALIFORNIA—*Berkeley*: E. J. Wickson.^c
- COLORADO—*Fort Collins*: C. A. Lory.^a
- CONNECTICUT—*Storrs*: C. L. Beach.^a
- DELAWARE—*Newark*: Geo. A. Harter.^a
Dover: W. C. Jason.^a
- FLORIDA—*Gainesville*: A. A. Murphree.^a
Tallahassee: Nathan B. Young.^a
- GEORGIA—*Athens*: A. M. Soule.^a *Savannah*: R. R. Wright.^a
- HAWAII—*Honolulu*: J. W. Gilmore.^a
- IDAHO—*Moscow*: E. E. Elliott.^c
- ILLINOIS—*Urbana*: E. Davenport.^c
- INDIANA—*Lafayette*: J. H. Skinner.^c
- IOWA—*Ames*: Albert Boynton Storms.^a
- KANSAS—*Manhattan*: H. J. Waters.^a
- KENTUCKY—*Lexington*: J. K. Patterson.^a *Frankfort*: John H. Jackson.^a
- LOUISIANA—*Baton Rouge*: Thos. D. Boyd.^a *New Orleans*: H. A. Hill.^a
- MAINE—*Orono*: George Emery Fellows.^a
- MARYLAND—*College Park*: R. W. Silverster.^a *Princess Anne*: Frank Trigg.^b
- MASSACHUSETTS—*Amherst*: K. L. Butterfield.^a
- MICHIGAN—*East Lansing*: J. L. Snyder.^a
- MINNESOTA—*University Farm, St. Paul*: A. F. Woods.^c
- MISSISSIPPI—*Agricultural College*: J. C. Hardy.^a *Alcorn*: L. J. Rowan.^a
- MISSOURI—*Columbia*: F. B. Mumford.^c
Jefferson City: B. F. Allen.^a
- MONTANA—*Bozeman*: Jas. M. Hamilton.^a
- NEBRASKA—*Lincoln*: E. A. Burnett.^c
- NEVADA—*Reno*: Joseph E. Stubbs.^a
- NEW HAMPSHIRE—*Durham*: Wm. D. Gibbs.^a
- NEW JERSEY—*New Brunswick*: W. H. S. Demarest.^a
- NEW MEXICO—*Agricultural College*: W. E. Garrison.^a
- NEW YORK—*Ithaca*: H. J. Webber.^a
- NORTH CAROLINA—*West Raleigh*: D. H. Hill.^a *Greensboro*: James B. Dudley.^a
- NORTH DAKOTA—*Agricultural College*: J. H. Worst.^a
- OHIO—*Columbus*: H. C. Price.^c
- OKLAHOMA—*Stillwater*: J. H. Connell.^a
Langston: Inman E. Page.^a
- OREGON—*Corvallis*: Wm. J. Kerr.^a
- PENNSYLVANIA—*State College*: Edwin E. Sparks.^a
- RHODE ISLAND—*Kingston*: Howard Edwards.^a
- SOUTH CAROLINA—*Clemson College*: W. M. Riggs.^c *Orangeburg*: Thomas E. Miller.^a
- SOUTH DAKOTA—*Brookings*: R. L. Slaughter.^a
- TENNESSEE—*Knoxville*: C. D. Schmitt.^c
- TEXAS—*College Station*: R. T. Milner.^a
Prairie View: E. L. Blackshear.^b
- UTAH—*Logan*: J. A. Widtsoe.^a
- VERMONT—*Burlington*: M. H. Buckham.^a
- VIRGINIA—*Blacksburg*: P. B. Barringer.^a *Hampton*: H. B. Frissell.^b
- WASHINGTON—*Pullman*: E. A. Bryan.^a
- WEST VIRGINIA—*Morgantown*: D. B. Purinton.^a *Institute*: Byrd Prillerman.^a
- WISCONSIN—*Madison*: H. L. Russell.^c
- WYOMING—*Laramie*: Chas. O. Merica.^a

^a President. ^b Principal. ^c Dean.
 [Bull. 228]

^a Acting dean. ^c Acting president.

U. S. DEPARTMENT OF AGRICULTURE,

OFFICE OF EXPERIMENT STATIONS—BULLETIN 228.

A. C. TRUE, Director.

PROCEEDINGS

OF THE TWENTY-THIRD ANNUAL CONVENTION
OF THE ASSOCIATION OFAMERICAN AGRICULTURAL COLLEGES AND
EXPERIMENT STATIONS

HELD AT

PORTLAND, OREG., AUGUST 18-20, 1909.

Edited by

A. C. TRUE AND W. H. BEAL,

FOR THE OFFICE OF EXPERIMENT STATIONS,

and

W. O. THOMPSON,

FOR THE EXECUTIVE COMMITTEE OF THE ASSOCIATION.



WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1910.

THE OFFICE OF EXPERIMENT STATIONS.

A. C. TRUE, Ph. D.—Director.

E. W. ALLEN, Ph. D.—Assistant Director and Editor of Experiment Station Record.

W. H. BEAL, B. A., M. E.—Chief of Editorial Division.

[Bull. 228]

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., April 9, 1910.

SIR: I have the honor to transmit herewith for publication Bulletin 228 of this Office, containing the proceedings of the Twenty-third Annual Convention of the Association of American Agricultural Colleges and Experiment Stations, held at Portland, Oreg., August 18-20, 1909.

Respectfully,

A. C. TRUE,
Director.

Hon. JAMES WILSON,
Secretary of Agriculture.

[Bull. 228]

CONTENTS.

	Page
Officers and committees of the association	7
List of delegates and visitors in attendance.....	9
Constitution	11
Minutes of the general session.....	15
Report of treasurer	15
Report of bibliographer.....	16
Secondary education in agriculture in the United States.....	17
Recommendations of executive committee	24, 45
Report of committee on graduate study	24
The better preparation of men for college and station work.....	25
Conservation of our natural resources.....	32, 46
Report of committee on extension work	34, 46
Status of the separate land-grant colleges.....	39, 43
Report of committee on instruction in agriculture	40
Report of committee on history of agricultural education.....	40
Report of committee on affiliation	42, 45
Work of the Country Life Commission.....	43, 44, 99
Amendment of the constitution	45
Resolutions of thanks.....	46
Election of officers.....	46
Report of committee on station organization and policy.....	47
Annual dues	49
Funds for the graduate school.....	49
Minutes of the sections.....	51
Section on college work and administration.....	51
Distinctive work of the land-grant colleges.....	51
Entrance requirements for land-grant colleges.....	65
Officers of the section.....	71, 99
Medium of publication of scientific work of the stations.....	72
Recommendations regarding extension work.....	72
The function of land-grant colleges in promoting collegiate and graduate instruction in agriculture.....	80
The function of the land-grant college in promoting agricultural education in secondary schools.....	87
How can agricultural colleges best serve farmers in solving rural problems?	94
Section on experiment-station work.....	100
Relation of the director to the members of the station staff.....	100
Research journal for experiment stations	110
Officers of the section.....	112, 121
Problems of irrigation.....	112
Irrigation investigations	117
Index of names.....	123

OFFICERS AND COMMITTEES OF THE ASSOCIATION.

President.

W. J. KERR, of Oregon.

Vice-Presidents.

H. J. WATERS, of Kansas; C. A. LORY, of Colorado;
W. P. BROOKS, of Massachusetts; P. H. ROLFS, of Florida;
L. FOSTER, of New Mexico.

Secretary and Treasurer.

J. L. HILLS, of Vermont.

Bibliographer.

A. C. TRUE, of Washington, D. C.

Executive Committee.

W. O. THOMPSON, of Ohio, *Chairman*;
J. L. SNYDER, of Michigan; W. H. JORDAN, of New York;
W. E. STONE, of Indiana; C. F. CURTISS, of Iowa.

OFFICERS OF SECTIONS.

College Work and Administration.

S. AVERY, of Nebraska, *Chairman*.
W. D. GIBBS, of New Hampshire, *Secretary*.
Program Committee.—The Chairman and Secretary of the Section.

Experiment Station Work.

F. B. LINFIELD, of Montana, *Chairman*.
H. L. RUSSELL, of Wisconsin, *Secretary*.
Program Committee.—The Chairman and Secretary of the Section, and W. H. BEAL, of Washington, D. C.

Extension Work.

A. M. SOULE, of Georgia, *Chairman*.
G. I. CHRISTIE, of Indiana, *Secretary*.

STANDING COMMITTEES.

Instruction in Agriculture.

For three years, J. F. DUGGAR, of Alabama, and W. E. STONE, of Indiana; for two years, A. C. TRUE, of Washington, D. C., *Chairman*, and T. F. HUNT, of Pennsylvania; for one year, H. J. WATERS, of Kansas, and H. C. WHITE, of Georgia.

Graduate Study.

For three years, W. O. THOMPSON, of Ohio, and BROWN AYRES, of Tennessee; for two years, H. P. ARMSBY, of Pennsylvania, *Chairman*, and HOWARD EDWARDS, of Rhode Island; for one year, M. H. BUCKHAM, of Vermont, and EUGENE DAVENPORT, of Illinois.

Extension Work.

For three years, A. M. SOULE, of Georgia, and E. A. BURNETT, of Nebraska; for two years, K. L. BUTTERFIELD, of Massachusetts, *Chairman*, and C. R. VAN HISE, of Wisconsin; for one year, W. C. LATTI, of Indiana, and C. F. CURTISS, of Iowa.

Experiment Station Organization and Policy.

For three years, M. A. SCOVELL, of Kentucky, and L. G. CARPENTER, of Colorado; for two years, EUGENE DAVENPORT, of Illinois, *Chairman*, and C. D. WOODS, of Maine; for one year, H. J. WHEELER, of Rhode Island, and E. B. VOORHEES, of New Jersey.

[Bull. 228]

LIST OF DELEGATES AND VISITORS IN ATTENDANCE.

- Arizona:** J. J. Thornber, delegate.
- Arkansas:** J. N. Tillman and C. F. Adams, delegates; G. A. Cole, visitor.
- California:** E. J. Wickson, delegate; E. E. Kaufman, H. W. Smith, W. H. Volck, and C. W. Woodworth, visitors.
- Colorado:** C. A. Lory and L. G. Carpenter, delegates; C. P. Gillette and W. P. Headden, visitors.
- Delaware:** H. Hayward, delegate.
- Florida:** P. H. Rolfs, delegate; A. W. Stewart, visitor.
- Georgia:** A. M. Soule, delegate; T. H. McHatton, visitor.
- Idaho:** J. A. MacLean, E. E. Elliott, and J. H. Frandson, delegates; H. T. French, R. E. Hyslop, C. D. Mason, J. R. Shinn, E. H. Twilight, and F. P. Van Hook, visitors.
- Illinois:** E. Davenport, delegate; Mrs. E. Davenport, Miss M. Davenport, A. G. Hughes, W. E. McDermut, A. A. Norton, and C. J. Rosbrook, visitors.
- Indiana:** W. E. Stone and A. Goss, delegates; G. I. Christie, W. C. Latta, and J. H. Skinner, visitors.
- Iowa:** A. B. Storms and C. F. Curtiss, delegates.
- Kansas:** H. J. Waters and E. H. Webster, delegates; E. R. Nichols and Mrs. E. R. Nichols, visitors.
- Kentucky:** H. Garman, delegate.
- Louisiana:** W. R. Dodson, delegate.
- Maine:** G. E. Fellows and C. D. Woods, delegates; W. A. Martin, visitor.
- Maryland:** R. W. Silvester, delegate.
- Massachusetts:** K. L. Butterfield, W. P. Brooks, and W. R. Hart, delegates; Mrs. K. L. Butterfield, J. L. Ellsworth, and F. W. Rane, visitors.
- Michigan:** J. L. Snyder and R. S. Shaw, delegates.
- Minnesota:** J. W. Olsen, delegate.
- Mississippi:** J. C. Hardy and W. L. Hutchinson, delegates; S. M. Tracy, visitor.
- Missouri:** F. B. Mumford, delegate.
- Montana:** F. B. Linfield, delegate.
- Nebraska:** S. Avery and E. A. Burnett, delegates; Mrs. S. Avery, Mrs. E. A. Burnett, A. E. Davisson, and V. Keyser, visitors.
- Nevada:** J. E. Stubbs and S. B. Doten, delegates.
- New Hampshire:** W. D. Gibbs, delegate.
- New Jersey:** W. H. S. Demarest, delegate.
- New Mexico:** W. E. Garrison and L. Foster, delegates; Mrs. L. C. Foster, visitor.
- New York:** L. H. Bailey, J. Craig, and W. H. Jordan, delegates; D. I. Duncan, R. A. Pearson, and B. von Herff, visitors.
- North Dakota:** J. H. Worst and E. F. Ladd, delegates; Mrs. E. F. Ladd and Mrs. J. H. Worst, visitors.

Ohio: H. C. Price and C. E. Thorne, delegates; A. D. Selby, visitor.

Oklahoma: J. H. Connell, delegate; J. C. Elliott, visitor.

Oregon: W. J. Kerr, J. Withycombe, and R. Withycombe, delegates; H. C. Atwell, J. A. Bexell, C. E. Bradley, J. C. Bridwell, Miss L. Collamore, A. B. Cordley, J. Dryden, Miss J. Green, C. R. Greisen, F. L. Kent, C. I. Lewis, E. R. Lyman, L. D. Mahone, L. T. Reynolds, H. D. Scudder, E. A. Shepard, H. V. Tarter, E. Tausch, C. D. Thompson, H. Umberger, and J. Wiseman, visitors.

Pennsylvania: T. F. Hunt, delegate; Miss M. J. Hunt and Mrs. T. F. Hunt, visitors.

Porto Rico: D. W. May, delegate.

Rhode Island: H. Edwards and H. J. Wheeler, delegates; Mrs. H. J. Wheeler, visitor.

South Carolina: T. E. Miller, delegate.

Utah: J. A. Widtsoe and E. D. Ball, delegates; L. A. Merrill, visitor.

Vermont: J. L. Hills, delegate; Miss B. Hills, visitor.

Virginia: H. L. Price, W. B. Ellett, and C. K. Graham, delegates; C. G. Burr and Mrs. C. K. Graham, visitors.

Washington: E. A. Bryan and R. W. Thatcher, delegates; R. K. Beattie, L. W. Hanson, A. L. Melander, S. B. Nelson, O. M. Olson, G. Severance, E. A. Smith, and W. S. Thornber, visitors.

West Virginia: D. W. Working, delegate.

Wisconsin: E. H. Farrington and H. L. Russell, delegates.

Wyoming: C. O. Merica, J. D. Towar, and J. C. Fitterer, delegates.

United States Department of Agriculture: A. C. True, delegate; W. H. Beal and J. Hamilton, visitors, Office of Experiment Stations.

Canada: G. A. Gigault and G. A. Putnam, visitors.

[Bull. 228]

CONSTITUTION.

[Amendments authorized by the Portland convention are shown in italics.]

NAME.

This association shall be called the Association of American Agricultural Colleges and Experiment Stations.

OBJECT.

The object of this association shall be the consideration and discussion of all questions pertaining to the successful progress and administration of the colleges and stations included in the association, and to secure to that end mutual cooperation.

MEMBERSHIP.

(1) Every college established under the act of Congress approved July 2, 1862, or receiving the benefits of the act of Congress approved August 30, 1890, and every agricultural experiment station established under State or Congressional authority, the Bureau of Education of the Department of the Interior, the Department of Agriculture, and the Office of Experiment Stations of the last-named Department, shall be eligible to membership in this association.

(2) Any institution a member of the association in full standing may send any number of delegates to the meetings of the association. The same delegate may represent both a college and a station, but shall vote in only one section and shall cast only one vote in general sessions. Other delegates may be designated by an institution to represent it in specified divisions of the sections of the association, but such delegates shall vote only in such divisions, and no institution shall be allowed more than one vote in any sectional meeting.

(3) Delegates from other institutions engaged in educational or experimental work in the interest of agriculture or mechanic arts may, by a majority vote, be admitted to conventions of the association, with all privileges except the right to vote.

(4) In like manner, any person engaged or directly interested in agriculture or mechanic arts who shall attend any convention of this association may be admitted to similar privileges.

SECTIONS.

(1) The association shall be divided into *three* sections: (a) A section on college work and administration, (b) a section on experiment station work, (c) *a section on extension work composed of directors or superintendents of extension departments in the institutions in this association, or the representatives of such departments duly and specifically accredited to this section.*

The section on college work and administration shall be composed of the presidents or acting presidents of colleges and universities represented in the association, or other representatives of such institutions duly and specifically accredited to this section, and no action on public and administrative questions shall be final without the assent of this section.

The section on experiment station work shall be composed of the directors or acting directors of experiment stations represented in the association, or of other representatives of such stations duly and specifically accredited to this section.

(2) Members of these *three* sections (and no others) shall be entitled to vote both in general sessions and in the section to which they respectively belong.

The representative appointed by the United States Bureau of Education shall be assigned to the section on college work and administration; the representative of the Office of Experiment Stations to the section on experiment station work; and the representative of the United States Department of Agriculture to either section as he may elect and the section by vote authorize; but such election once made and authorized may not be changed during the sessions of a given convention.

Each section may create such divisions as it may from time to time find desirable, and shall elect its own chairman and secretary for sectional meetings whose names shall be reported to the association for record.

(3) Each section shall conduct its own proceedings, and shall keep a record of the same, and no action of a section, by resolution or otherwise, shall be valid until the same shall have been ratified by the association in general session, and in the case provided for in the foregoing paragraph (1) shall also have been approved by the section on college work and administration.

MEETINGS.

(1) This association shall hold at least one meeting in every calendar year, to be designated as the annual convention of the association. Special meetings may be held at other times, upon the call of the executive committee, for purposes to be specified in the call.

(2) The annual convention of the association shall comprise general sessions and meetings of the sections, and provision shall be made therefor in the program. Unless otherwise determined by vote, the association will meet in general session in the forenoons and evenings of the convention and the sections in the afternoons.

OFFICERS.

(1) The general officers of this association, to be chosen annually, shall be a president, five vice-presidents, a bibliographer, and a secretary, who shall also be treasurer; and an executive committee of five members, three of whom shall be chosen by the section on college work and administration and two by the section on experiment station work: *Provided, however,* That a member chosen by either section need not be a member of that section. The executive committee shall choose its own chairman.

(2) Each section shall, by ballot, nominate to the association in general session for its action a chairman and a secretary for such section.

(3) The president, vice-presidents, secretary, and bibliographer of this association shall be elected by ballot upon nomination made upon the floor of the convention, and shall hold office from the close of the convention at which they are elected until their successors shall be chosen.

(4) Any person being an accredited delegate to an annual meeting of the association, or an officer of an institution which is a member of the association in full standing at the time of election, shall be eligible to office.

DUTIES OF OFFICERS.

(1) The officers of the association shall perform the duties which usually devolve upon their respective offices.

(2) The president shall deliver an address at the annual convention before the association in general session.

(3) The executive committee shall determine the time and place of the annual conventions and other meetings of the association and shall between such conventions and meetings act for the association in all matters of business. It shall issue its call for the annual conventions of the association not less than sixty days before the date on which they are to be held, and for special meetings not less than ten days before such date. It shall be charged with the general arrangements and conduct of all meetings called by it. It shall designate the time and place of the convention. It shall present a well-prepared order of business—of subjects for discussion—and shall provide and arrange for the meetings of the several sections. The subjects provided for consideration by each section at any convention of the association shall concentrate the deliberations of the sections upon not more than two lines of discussion, which lines, as far as possible, shall be related. Not more than one-third of the working time of any annual convention of the association shall be confined to miscellaneous business.

FINANCES.

At every annual convention the association in general session shall provide for obtaining the funds necessary for its legitimate expenses and may, by appropriate action, call for contributions upon the several institutions eligible to membership; and no institution shall be entitled to representation or participation in the benefits of the association unless such institution shall have made the designated contribution for the year previous to that in and for which such question of privilege shall arise, or shall have said payment remitted by the unanimous vote of the executive committee.

AMENDMENTS.

This constitution may be amended at any regular convention of the association by a two-thirds vote of the delegates present, if the number constitute a quorum: *Provided*, That notice of any proposed amendment, together with the full text thereof and the name of the mover, shall have been given at the next preceding annual convention and repeated in the call for the convention. Every such proposition of amendment shall be subject to modification or amendment in the same manner as other propositions, and the final vote on the adoption or rejection shall be taken by yeas and nays of the institution then and there represented.

RULES OF ORDER.

(1) The executive committee shall be charged with the order of business, subject to special action of the convention, and this committee may report at any time.

(2) All business or topics proposed for discussion and all resolutions submitted for consideration of the convention shall be read and then referred,

without debate, to the executive committee, to be assigned positions on the program.

(3) Speakers invited to open discussion shall be entitled to twenty minutes each.

(4) In general discussions the ten-minute rule shall be enforced.

(5) No speaker shall be recognized a second time on any one subject while any delegate who has not spoken desires to do so.

(6) The hours of meeting and adjournment adopted with the general program shall be closely observed, unless changed by a two-thirds vote of the delegates present.

(7) The presiding officer shall enforce the parliamentary rules usual in such assemblies and not inconsistent with the foregoing.

(8) Vacancies which may arise in the membership of standing committees by death, resignation, or separation from the association of members, shall be filled by the committees, respectively.

[Bull. 228]

PROCEEDINGS OF THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.

MINUTES OF THE GENERAL SESSION.

MORNING SESSION, WEDNESDAY, AUGUST 18, 1909.

W. E. Stone, of Indiana, member of the executive committee, called the meeting to order at 10 o'clock a. m., at the Commercial Club, of Portland, Oreg., and designated W. J. Kerr, of Oregon, first vice-president of the association, to act as the presiding officer in the absence of the president, M. A. Scovell, of Kentucky.

Prayer was offered by Rev. D. Dyott, of Portland.

After the call of the roll of the delegates the report of the executive committee was presented by W. E. Stone in the absence of the chairman of the committee, W. O. Thompson, of Ohio.

The report was received and placed on file. For further action on it see page 24.

REPORT OF TREASURER.

The treasurer, J. L. Hills, submitted the following report:

Report of treasurer, November 18, 1908, to August 18, 1909.

GENERAL FUNDS.

Receipts:

To cash on hand Washington meeting	\$1,394.76
To 95 dues	1,425.00

Total	2,819.76
-------	----------

Disbursements	1,382.38
---------------	----------

Balance on hand in July, 1909	1,437.38
-------------------------------	----------

Classification of disbursements:

Executive committee	743.93
Research committee	81.58
Committee on conference with President Taft	381.81
Representative before Carnegie Foundation	73.15
Stenographer, college section	65.80
Secretary-treasurer	34.11
Chart, President Butterfield	2.00

Total	1,382.38
-------	----------

GRADUATE SCHOOL SUBSCRIPTION FUND.

Receipts: To 22 subscriptions	550.00
-------------------------------	--------

Disbursements: Committee on graduate study	171.68
--	--------

Balance on hand July, 1909	378.32
----------------------------	--------

[Bull. 228]

The accounts of the treasurer were audited and approved by a committee appointed by the chair, consisting of R. W. Silvester, of Maryland, and E. Davenport, of Illinois.

REPORT OF BIBLIOGRAPHER.

The bibliographer, A. C. True, of Washington, D. C., submitted the following report:

The subject to which your bibliographer wishes to call attention this morning especially is the experiment station library. With the increase of funds and workers I am convinced that there is need of more systematic attention on the part of the stations to their library and bibliographical work. I am not speaking so much now of the general library requirements. The college library may properly include the station library and all books belonging to the station as a department of the college may properly be catalogued in the general college library. But as a rule the general college arrangement for library service is not sufficient to meet the needs of the station. Many of the institutions show great liberality in the purchase of scientific and technical books and journals required by the station work, and this is certainly to be commended. There are some institutions, however, that have not yet felt the need of supplying the station workers with the highest class of scientific literature, which is very essential to their work, and this matter should receive the serious attention of all the institutions with which the stations are connected.

But whatever the details of the library arrangement for the institution as a whole may be, the station needs special collections of books, journals, and documents which shall be primarily for its use and shall be made readily and constantly available to the station workers. The station should also have, if possible, the services of some person trained in library and bibliographical matters who may give his time and energy quite fully to the special requirements of the station along these lines.

There is now a great accumulation of public documents, both national and state, and privately issued publications of miscellaneous kinds bearing on the work of the stations, and I am referring now especially to matters outside of the regular periodical publications, and particularly to the more fugitive publications which are difficult to trace and follow out. Much of this material, which is valuable to station workers, can be had at little or no expense as regards its purchase. It is quite difficult for the individual investigator or expert to follow up such matters even in his own line, and he needs the assistance of some one who will make it his special business. The collection, safeguarding, and general care of this material is a considerable task, and I am sure that there are quite a number of our stations where this work is not as yet adequately attended to.

In the special matter of public documents my observation and experience indicate that the stations, and I think this is also true of the colleges, have not as yet sufficiently regarded the importance of keeping their files of such documents complete and in readily available form. The impression seems to be still widespread that such documents if lost can be easily replaced. There does not seem to be the care of them, therefore, that there is of ordinary books. But anyone who has to deal with this matter at close range knows that many of the public documents, and especially those that have some particular value, when once lost can not be replaced, and hence there is need of care in preserving them. Of equal importance is the making of the contents of this mass of material available to the station worker. It is true we have the Experiment Station Record, which contains a brief summary of such publications generally, but I believe that beyond the use of that publication there is need of definite bibliographical work on behalf of the station worker.

The station investigations may be greatly aided and promoted by having some person who can assist in looking up references, making excerpts, making and taking care of indexes, and doing bibliographical work of a miscellaneous character. The matter of exchanges and loans of publications through the Department of Agriculture, through the other colleges and stations, through local libraries which are especially rich in useful material, is also important.

To cover the work which I have in mind the stations do not need a librarian in the ordinary acceptation of the term, but rather what may be called a bibliographical aid, i. e., some one who has scientific knowledge and who is properly trained so as to give efficient aid in bibliographical matters to the station staff.

And it may be urged in connection with this matter that such service is not very expensive. There is now a fairly good supply of people sufficiently well trained for this work who can be obtained at relatively low salaries, and the matter seems to me of sufficient importance to receive careful attention.

Turning aside from that matter, there are two books to which I wish to call the attention of the association as of special interest and importance. These books have been published within the past year and so are properly included in my annual report as bibliographer. One of these is the *Encyclopedia of Agriculture* prepared under the leadership of a distinguished member of this association and very largely contributed to by men included in this association. That work I am sure you will all agree is of very great importance to the movement for agricultural education and research in this country, as well as to the wider movement for agricultural progress. The putting of the accumulations of our agricultural experiment stations and other similar institutions and agencies into readily available form for reference in such works is, at the present stage of education and research in agriculture in the United States, of prime importance; and the presentation of agricultural information for the general reader in up-to-date fashion is also, in my judgment, of very great importance.

A smaller work, but one of very considerable interest, is a book on the *Methods of Agricultural Instruction*. This was prepared by M. De Vuyst, of Belgium. He is the general inspector of agricultural experiment stations in that country. He is also familiar with agricultural institutions in this country because he has spent some time here. His work is of interest to many of us because we know him personally. He has attempted for the first time to bring together in summary form a statement of the organization and methods of agricultural education in different countries and in institutions of different grades, and has produced a book which is of considerable importance at the present time. It is published in the French language in Brussels.

The report was accepted.

SECONDARY EDUCATION IN AGRICULTURE IN THE UNITED STATES.

A. C. True made the following address:

I propose first to outline briefly the present status of secondary education in agriculture in the United States.

Twelve years ago, when Secretary Wilson came to the United States Department of Agriculture, there were but 10 agricultural high schools in the country, and the teaching of agriculture in normal schools or in public elementary schools had merely begun. To-day there are 60 agricultural high schools, or definitely secondary agricultural courses in colleges; 346 public high schools teaching agriculture; and 119 state or county normal schools and 16 agricultural colleges training young men and women to teach agriculture. In addition to these there are a number of private institutions giving secondary instruction in agriculture, and 16 institutions offering correspondence courses or reading courses which are practically of secondary grade, making in all about 500 institutions giving secondary instruction in agriculture.

For the purposes of this discussion these institutions may be classified as follows:

- (1) The agricultural colleges, where the instruction is given through definitely organized agricultural high schools, as in Minnesota, or through short or special courses of different kinds. The agricultural colleges as a body are giving much secondary instruction in agriculture. In some cases this is definitely organized as such, and in other cases it is given under a variety of names.
- (2) Agricultural high schools in congressional or other large districts, as in Minnesota and Alabama.
- (3) County agricultural high schools, as in Michigan and Wisconsin.
- (4) State or county normal schools.
- (5) Ordinary high schools either in cities, townships, or counties.
- (6) Private colleges and schools.
- (7) Correspondence schools.

In a general way, though very inadequately, I have stated the present scope of instruction in agriculture in secondary schools in this country. It must be said that the movement is still in an experimental stage, and the most encouraging thing about it now is that we have a sufficient number of experiments in this kind of education in progress so that we shall hope to have some pretty definite results worked out from experience within a comparatively short time.

I think we should all agree that it is now too early to say what the American system of secondary education in agriculture will ultimately be. From the study which I have been able to make of this subject I am inclined to sum up the matter from a somewhat ideal point of view in the following statement:

(1) Agriculture, including horticulture and forestry (and it is well to bear in mind that where I use the term agriculture I would use it in the ordinary sense to include the whole subject), should be a regular part of public secondary education; (2) the unity of the educational system should be maintained, but there should be sufficient elasticity of curricula to meet the various needs of the people; (3) the standard curriculum of secondary schools having agricultural courses should conform in a general way to that adopted for the general school system of the State; (4) the standard agricultural courses, whether in the ordinary high schools or in special schools, should not be narrowly vocational, but should aim to fit the pupil for life as progressive, broad-minded, and intelligent men and women, as well as good farmers and horticulturists; (5) the standard courses in agricultural secondary schools should be so organized as to form a natural and proper preparation for entrance to agricultural colleges.

The conditions of entrance requirements to colleges are, in my judgment, far from satisfactory. It is not likely that we have reached the ultimate plan for the preparation of the great mass of students who in the future will desire college courses. It seems certain that when the so-called vocational subjects are properly organized and taught in the secondary schools they will be generally recognized as having much pedagogical value. This is especially true of agriculture, which is a subject embracing much of general human interest. Even under present conditions the agricultural colleges would do well to give credit in their entrance requirements for agricultural subjects properly taught in secondary schools.

The agricultural college should have a definite legal relation to our public-school system, and especially to the courses or schools of agriculture of secondary and elementary grades. By this I mean that the state legislatures should take definite action recognizing that agricultural colleges have a definite function to aid in the organization of a proper system of secondary instruction in agriculture, and help the secondary schools in that work.

One difficulty now in the progress of this movement is that in quite a number of States the legislation is such that the agricultural colleges, if they take any part in it, have to "butt in." The whole matter of secondary education is in many States intrusted to the state department of education, as far as the State deals with the matter. I think that ought to be remedied. It may be said that that is only part of a wider thing. I do not believe that we have yet in this country considered definitely enough the proper relation of our universities and colleges to the more elementary education. These higher institutions in many States yet stand too much apart from our general system of education. It is very desirable, it seems to me, that they should be recognized by statute everywhere as an essential part of our system of public education. And while that general movement is proceeding the friends of agricultural education should urge that the agricultural colleges should have a definite part in the organization and maintenance of systems of agricultural education in public schools.

Agricultural colleges will have to do secondary work to a considerable extent for some time to come. We can not, in my judgment, jump immediately in all our agricultural colleges to a state of things where all the secondary work is excluded. This should, however, be definitely organized as separate and distinct from the college work. The aim should be to have all secondary work relegated to secondary schools, entirely separate from the colleges, when such schools are efficiently organized with reference to instruction in agriculture.

Agriculture should be generally introduced into the ordinary high schools. There should also be a limited number of special agricultural high schools in the different States. These should be so limited in number that they will be organized with reference to large districts. I do not believe it is either necessary or desirable to organize such schools with the county as the unit. Experience so far points to the fact that the county is too small a unit for the proper equipment and maintenance of a thoroughgoing agricultural high school. These special schools should have a relatively large agricultural faculty and an adequate equipment, so that students going to them will not only have offered to them a standard course of high school or secondary grade, but will

also have opportunity to specialize to a certain extent along different agricultural lines. I believe that such schools are needed, because they will in a way set the pace for secondary education in agriculture, and will help rather than hinder the general introduction of agriculture into the ordinary high schools. Besides serving more general purposes, they will attract a good many of the more mature students, who are not ready or financially able to go to college, but desire to go somewhere to get some definite instruction in agriculture, and who are really too old to feel comfortable in the ordinary high school. These schools will also aid in the preparation of teachers and school officers for the rural schools; so that in a way these special agricultural schools will more fully meet the need which is now being met to a limited extent by the special and short courses in the agricultural colleges.

As I said, I believe the standard courses in these special agricultural schools should not be narrowly vocational, but should conform, in a general way, to the general standard for the high-school system in the State, and they should be organized so as to connect them definitely with the general educational system of the State. To do this it will probably be found necessary in the case of schools that have shortened the school year to twenty-four weeks of six days each, instead of thirty-six weeks of five days each, to add another year to the standard course, making it five years instead of four. But it would be desirable that besides the standard courses which would prepare the student for college or for life, as the case might be, such schools should have shorter courses more purely vocational.

To illustrate the kind of special agricultural school which might be organized in accordance with the principles set forth in his paper, Doctor True presented the syllabus of a four-year secondary course in horticulture, prepared for an association of horticulturists, in which English, algebra, geometry, history, botany, chemistry, and French or German, together with some electives, were combined with a course in horticulture to which the student was required to give at least one-fourth of his time during four years and might give about one-third, if all the horticulture offered in electives was taken. A two-year course was also outlined in which one-half the time would be devoted to horticulture. A similar arrangement of courses was recommended for general agriculture.

T. F. HUNT, of Pennsylvania. A question has been raised as to just what Doctor True meant by the legal relation which should exist between the agricultural colleges and the secondary schools.

A. C. TRUE. I meant that the state legislature should take definite action recognizing that agricultural colleges have a definite function to aid in the organization of a proper system of secondary instruction in agriculture, and help the secondary schools in that work.

H. C. PRICE, of Ohio. I think the situation in Ohio is worthy of consideration. Just before leaving home I had letters from presidents of two of the small colleges of the State as to how they might arrange their courses of study so as to include agriculture, and also what modification they might make in their courses of study so as to prepare their students for admission in our college with credit for the first two years of our courses. There are between forty and fifty colleges in Ohio, and necessarily some of them are relatively weak. Some of these institutions are located in most excellent agricultural communities, and their constituency is necessarily largely local.

The two problems that have arisen in connection with these institutions are, first, how can their work be coordinated with our college of agriculture so that at least the first two years of our course can be taken in the local institution; and, second, what can they do in giving technical instruction that will serve as the finishing course for the students who attend them. I have no doubt that this same question is arising in other States and will have to be dealt with in the near future.

E. A. BRYAN, of Washington. I would like in a word to express my very hearty assent to the suggestion that in so far as possible we should aim at a reorganization of the existing system of secondary education; that is, in the modification of our present educational system in the direction of industrial education we attempt to utilize in so far as possible the existing system. We must remember in the first place that it is well organized in all States of the Union. The existing system of secondary education has ample provision in the way of taxation. It has an organization. It has the confidence of the people. The people believe in our system of public education, and it seems to me that it is very much wiser upon our part, instead of attempting to establish a duplicate system of secondary education, to modify, so far as possible, the existing system in this direction. It can be done easily for the reason that the people in general are looking in this direction. They believe in the fundamental principles which the agricultural college stands for and they are ready to modify the curriculum of any and every high school in this direction. I believe, furthermore, in the suggestion of Doctor True that in the several States a few agricultural high schools should be established—distinctly agricultural high schools—and they should conform as far as possible to the existing system and be an integral part of the public-school system, and that the curriculum itself should conform in the main to the general standard and general ideals of the existing high-school system, with the addition, of course, of these particular courses. In that respect the suggested course in horticulture which he has outlined to us commends itself very strongly to my judgment. In fact, I wish to express my very hearty approval of the entire set of principles suggested by Doctor True. I should be glad to circulate in my State 10,000 copies of the remarks just made by Doctor True.

A. B. STORMS, of Iowa. I want to express myself in a similar way in indorsement of these principles as laid down by Doctor True. I would like to move the adoption of this report, which would of course carry with it the approval of this association of the principles there enunciated. I think it is a most admirable statement and one that would do great good.

J. L. SNYDER, of Michigan. I have never been convinced that the separate agricultural secondary school was advisable in the majority of our States. I believe that agricultural education will progress more rapidly without the introduction of that type of school in our State, and in that particular I would respectfully dissent from the report. Now, it may be that in some States the cause will be advanced by the introduction of a few of the secondary schools. I believe in the main they are a snare and a delusion as far as the general progress of agricultural education is concerned and that we should not encourage them.

E. A. BURNETT, of Nebraska. I rise only to suggest that a limited number of secondary agricultural schools may be established in a State without seriously modifying the educational system now established and without being out of harmony with the present system. Such schools might be established under a joint management, by which the present state boards or departments of education would be mainly responsible for the school, and in that case I do not see that there could be the difficulties which have been suggested.

C. F. CURTISS, of Iowa. I think the position that Doctor True has taken upon this question is conservative and eminently sound, and I think the association can well afford to indorse that position. It will be difficult enough for the agricultural colleges to furnish teachers to do the work in the special agricultural high schools that may be established in addition to those required by the high schools now in existence. These special agricultural high schools

will train teachers for the work in the high schools in the system now in existence. One of the great difficulties, perhaps the greatest difficulty in the way of the practical development of this work, is that of securing teachers. The high schools can not command the services of the best graduates turned out by the land-grant colleges for the reason that they do not feel justified in paying or are not able to pay the salaries that will command the best talent. I think that the secondary schools, if they serve no other purpose, would serve an excellent purpose in helping to train the teachers for this extension of the work in the public schools. I trust the association can give its indorsement to the position taken by Doctor True.

E. DAVENPORT, of Illinois. I would be inclined to agree with President Snyder in this matter but for the fact that the kind of special agricultural school that Doctor True outlines is just the kind of a school that we need and ought to have. It is not very much of a special agricultural school, for it provides that one-quarter of the time of the students shall be devoted to agriculture. I do not agree with the view that special agricultural schools will provide teachers for agricultural work. Nor do I agree that the high schools will be able to pay sufficient salaries to get the right kind of teachers.

E. J. WICKSON, of California. In California we have two distinctly agricultural high schools, one established by the State and one established by the College of Agriculture, both doing good work. They are serving as most excellent models for the high schools which desire to introduce agriculture as part of their course. The courses of study that we are following in those two distinctly agricultural high schools are being imitated by the regular high schools so far as they go with the subject. In regard to teachers, our agricultural high schools are actually preparing teachers. Dean Davenport says they can not, but they do. Of course, they are not agricultural teachers of very high grade, but they are taking hold of agricultural subjects which our people insist upon.

A. B. CORDLEY, of Oregon. If we are to have agricultural high schools which might serve as models for other high schools, well and good; but if we are to have agricultural high schools which will be vocational schools I am opposed to them. It seems to me that the agricultural colleges are going to have more than they can possibly do to train teachers for the high schools, and that it is much more important for the agricultural colleges to get in touch with the organized regular school work than to attempt to foster a special line of work.

J. L. SNYDER. We have in our State one agricultural school organized as such, its course of study modeled after the Wisconsin agricultural schools. It is vocational, just as the other separate agricultural schools are. Now, we have also in the State one high school, and will have six next year, that has organized an agricultural department. It has employed an agricultural college graduate who is given about 20 to 25 per cent of the students' time for agricultural work. Now, in my judgment, there is no comparison between those two schools, the one is simply a training school, the students in the school are young and immature. They are there simply to get a little training to help them to run their farms. The other is a dignified four-year course and leads to something educational as well as practical. Next year we will have six such schools. I believe that it is a mistake for this convention to place itself upon record as indorsing the establishment of separate agricultural schools. I should teach agriculture as manual training has been taught throughout the country, as part of our educational system.

E. A. BRYAN. I desire to second the motion. I think, in the first place, we ought to modify our high-school system in this direction. If it was desirable to have a very few schools we might establish agricultural high schools in each

State, modeled on the outline suggested by the speaker, our graduates filling the teachers' positions. But I would be one of the first to oppose the establishment of a duplicate system of secondary schools in the United States. I think it would be foolish in every respect. I think it would be foolish also to establish a large system of schools comparatively vocational. We may indeed modify our existing system of high schools in this direction. We may add to them here and there a few distinctively industrial schools modeled very much on the same plan as the regular high schools, supported in the same way, conforming to the same general system, and for the same purposes. It seems to me that is precisely the conservative position which this convention ought to indorse.

C. D. Woods, of Maine, moved that the motion of President Storms be amended by placing the word "accept" in place of the word "adopt."

A. B. STORMS. A word on the amendment. I made the motion to adopt for the express purpose of securing the indorsement of this association to the principles as enunciated by Doctor True. I think the bugaboo that President Snyder sees is one of his own conjuring. It never would have occurred to anybody listening to this report, I believe, impartially, without any previous dreams, that it was intended to indorse or approve or to secure, if possible, the establishment of such schools as he speaks of. It might be so perverted, but it would be a perversion. The outline of a system of agricultural schools as there given is an admirable one. Schools are being established in some of the States. If so, I would say they surely should have a good guide. Where could we get a better one than the one suggested by Doctor True?

Personally, I feel that we should be very conservative in any State about establishing special training or vocational schools; but if they are to be established in any State, it seems to me they should be modeled after such a plan as this, and I wish that we might find a practically unanimous approval of this plan. Things are in a state of transition. Public opinion is forming. Legislatures are likely to act and sometimes act unwisely if there is not a guide for their action.

L. H. BAILEY, of New York. I am wondering whether the discussion would not be clarified if we had a definition of what is meant by secondary education. The discussion seems to assume that secondary education covers all grades of educational work not distinctly collegiate. But it does not. The term "secondary," as applied in school organization has a definite meaning. Winter-course work, as ordinarily conducted, is not secondary education. It is special education. So, the work of these particular vocational schools of which President Snyder and others have been speaking is not "secondary" work. It is a special work. I feel, however, no matter how many special or separate schools of agriculture there may be, the agricultural colleges always will do winter-course work. There will always be persons wanting particular training in this branch or that, who will come to a winter school. Some of those who would now go to the winter course in the college will in time, I hope, go to the agricultural school, but there will still remain a large class of young persons who want to go farther than the school can take them or to particularize more closely, these persons will come to the agricultural college; they will not be satisfied with the equipment and facilities of the special local schools, no matter how good these schools may be. We need to distinguish between secondary work, special or separate work, and the winter-course work in colleges; they are in different categories.

K. L. BUTTERFIELD, of Massachusetts. I hope that the motion of Doctor Storms will prevail. Doctor True's address is a lucid statement of the position that I

think we can afford to take at the present time. There is need just now of some such summary, for the question of agricultural education of a secondary grade is still in a chaotic condition. It would be wise if this association could agree upon some such platform as Doctor True has announced.

Personally, I would not like to vote for the resolution of President Storms if it seemed to imply that the statement by Doctor True is a statement of ultimate principles, all the details of which are to be carried out in the future development of our system of agricultural education. But it seems to me that for present purposes Doctor True's platform is admirable. So far as I can interpret the movement that is under way in our part of the country, there is surely going to be a place for the separate vocational school of agriculture of a grade substantially that of the present high school, though I think that such a school will eventually take pupils who are somewhat more mature than the average high-school pupils. Our system of agricultural education will not be complete until we have developed a complete system of vocational agricultural schools of a secondary grade. Such schools should be an organic part of our public-school system. This process may take a generation; it may take two generations.

Furthermore, I feel confident that during the next two decades we are going to reorganize our idea of what constitutes a vocational course. Some of the subjects of study as enumerated by Doctor True will be eliminated. Social subjects, which at present are not included, will some time be subjects of study in these schools. But as an expression of opinion for a present program, it seems to me that Doctor True's statement is most admirable.

J. A. MACLEAN, of Idaho. I would like to ask whether it is not possible to secure several thousand advance copies of this report. The paper is so important and so valuable and so timely, and the conditions in many of the States make the need of it so great, that I hope it will be found possible to secure the publication of several thousand advance copies of this paper.

A. C. TRUE. I am very much surprised and somewhat overwhelmed by the way in which this paper has been received. If I had realized that this matter was coming up in this form I fear I should have hesitated to come before the association with my remarks in such a form as they have been presented. If it is desired that this matter should be put in form for publication, and publication made, as has been the custom, through the Office of Experiment Stations as a circular, I think that can probably be brought about at an early date.

I agree in many particulars with a good many of the remarks that have been made by various gentlemen who commented upon the paper. With Dean Bailey, for instance, I should agree that in the careful consideration of this matter there should be a definition of secondary instruction, and also that the agricultural colleges will always need to give special instruction. The most important matter for the consideration of the association relates to the general character of these special agricultural schools, which are being established in a considerable number of States. The judgment of the association upon that point would also affect a wider question. We are running very rapidly in this country toward the establishment of courses and institutions for vocational training, and for myself I fear that there will not be proper consideration given to the character of such courses and institutions. It looks as if we were to have upon a wide scale a revival of the old trade-school ideas and the insistence in many quarters on the establishment of institutions with narrowly vocational courses. I do not believe that is a wise thing, and especially am I opposed to that kind of institution for agricultural education. The properly trained farmer should be much more than a mere manual worker. He should be a broad-

mindful citizen, a home maker, and should be fitted for life in the country in a broad way.

I therefore think that in our present state of progress and trend of movement it is a very important thing for this association to consider the matter of these schools in a broad way, and if it does anything I should hope, certainly, that it would indorse the idea that such institutions should be broadly organized rather than that they should be narrowly vocational.

The motion to accept rather than adopt the views set forth in the paper was lost.

The original motion that the views expressed in the paper be adopted was carried.

On motion of C. D. Woods, of Maine, the secretary was instructed to send a telegram to President M. A. Scovell and to W. O. Thompson, chairman of the executive committee, expressing the regret of the association at their absence.

RECOMMENDATIONS OF EXECUTIVE COMMITTEE.

On motion of E. Davenport, the chair was instructed to appoint a committee to consider the recommendations contained in the report of the executive committee.

The chair appointed on this committee E. Davenport, of Illinois; A. B. Storms, of Iowa; and E. A. Bryan, of Washington. (See report, p. 45.)

On motion, a recess was taken until 8 o'clock p. m.

EVENING SESSION, WEDNESDAY, AUGUST 18, 1909.

The association was called to order at 8 p. m. by Vice-President Kerr.

REPORT OF COMMITTEE ON GRADUATE STUDY.

The report of this committee was presented by Howard Edwards, of Rhode Island, in the absence of the chairman, H. P. Armsby, of Pennsylvania, as follows:

The resignation from the committee of Dean L. H. Bailey and the retirement of President R. H. Jesse brought about a change of one-third of the membership of the committee, and left it without a chairman. The vacancy caused by Dean Bailey's resignation was filled by the appointment, by the president of the association, of President Howard Edwards, of Rhode Island. After some unavoidable delays, Dean Eugene Davenport, of Illinois, was chosen by the committee to fill the vacancy caused by President Jesse's retirement, and H. P. Armsby was elected chairman of the committee. The committee presents at this time a report of progress.

The first official action of the committee was the unanimous election of Dr. A. C. True as dean of the summer school, and, with the consent of the Secretary of Agriculture, Doctor True has accepted the position. The committee feels that it is very fortunate in being able to continue the administration which has made previous sessions of the school so successful, and takes this opportunity to express its obligations to Doctor True for his willingness to undertake the arduous duties of the deanship, and to the honorable Secretary of Agriculture for the interest which he has again manifested in authorizing Doctor True to serve the association in this capacity.

After full correspondence between members of the committee, including the dean, and with the authorities of the Iowa State College, the invitation of that institution to hold the graduate school of 1910 at Ames, Iowa, was unanimously accepted, and on June 19, 1909, the committee, together with Dean True, met at Columbus, Ohio, for conference with President A. B. Storms and Dean C. F. Curtiss, of the Iowa State College, regarding plans for the session. A general outline of the course was presented by Dean True and approved by the com-

mittee, subject to such modifications of details as may prove necessary. The following is an outline of the proposed course:

The programme of the graduate school of 1910 will include courses in plant physiology and pathology, agronomy, horticulture, animal husbandry, dairying, rural engineering, and rural economics. There will also be public opening exercises and a number of meetings for the discussion of general topics in agricultural pedagogy, agricultural extension work, country-life problems, conservation of natural resources, and similar topics.

Announcements regarding local arrangements will be made later by the registrar appointed by the Iowa State College.

The committee desires also to ask the attention of the convention to the important matter of the financial support of the graduate school. It scarcely seems necessary to present any arguments regarding the importance of graduate work. The phenomenally rapid widening of the field of educational effort in agriculture, as well as the rapid growth of the demand for scientific investigation, has at once emphasized the importance of thorough training of the investigator and teacher and tended to diminish the relative supply of qualified men. No more important problem faces the institutions represented in this association than that of fostering advanced study in agriculture and related subjects on the part of those who presumably are to become the leaders of agricultural progress in the next generation.

As is well known to the members of the association, the support of the graduate school is derived from three sources: First, the special contributions made by institutions represented in the association; second, the registration fees of students; and, third, the contribution by the holding institution. In accordance with the action of the association the committee, under date of May 12, 1909, called upon each college and each independent experiment station represented in the association for the regular contribution of \$25 for the year ending June 30, 1909. Up to the date of this meeting the treasurer of the association reports the payment of this contribution by 22 institutions. It is the earnest hope of the committee that those institutions which have not already contributed to this undertaking will forward their contributions to the treasurer at an early date. A similar contribution will be called for later for the year 1909-10.

It should be clearly understood that this contribution is entirely separate from and in addition to the regular dues of the association. The contributions made under this action constitute a special fund in the treasury, which is used only for the payment of the expenses of the graduate summer school. On the basis of the expenses of the past two schools, it may be conservatively estimated that the amounts available from the contributions of the colleges and stations and from students' fees will fall short of the total expense of the school by approximately \$1,500, which deficit must be borne by the holding institution. While thus far no difficulty has been experienced on this score in locating the school, such a contribution is, nevertheless, a heavy tax upon a single institution for the benefit of all. It would seem that if the institutions concerned are not willing to increase the amount of contribution now authorized, they should, at least, if the school is to remain an undertaking of the association, feel under obligations to contribute the comparatively small amount asked for, except, of course, in the few cases where legal difficulties seem to interpose.

H. P. ARMSBY,
HOWARD EDWARDS,
M. H. BUCKHAM,
W. O. THOMPSON,
BROWN AYRES,

Committee.

THE BETTER PREPARATION OF MEN FOR COLLEGE AND STATION WORK.

L. H. Bailey, of New York, presented the following paper on this subject:

The colleges of agriculture are at last established and are well accepted in the public mind. It is no longer necessary to apologize for them or even to defend them. Therefore we are free to devote our attention to the internal constructive evolution of them.

We are now beginning to be consciously concerned in the development of a thoroughly good and sound rural civilization. The colleges of agriculture will

be the most important agencies in this evolution. Therefore these colleges carry immense responsibilities.

The colleges of agriculture must train farmers.^a They must also train the trainers of farmers. This double work must be clearly recognized and the instruction must be developed to meet it. It is not to be expected that when the college meets the needs of its constituency, however well it meets them, it thereby meets the needs of those who would be trained to be teachers and investigators. The college that makes no adequate distinction between these two lines of service ought not to undertake to train men for the best leadership work, or to expect that even the best men from the graduating classes will be fitted for it.

If the college of agriculture represents rural civilization, then it follows that its work must be of divers kinds and that it will attract men and send out men of many divergent types of mind. As the college of agriculture is a state institution, being endowed by all the people, it owes itself to all rural-minded residents of the commonwealth. It must do good research work, for on this rests the value of its effort; it must teach those who come to it, if they have proper qualifications; it must extend itself to all the people in the commonwealth, for in the end all the people will matriculate, even though they remain at home on the farms. In all these three lines, also—in research, in regular college teaching, in extension effort—men and women must be trained for forthcoming positions; some of the colleges of agriculture must undertake to train them. Agriculture is becoming a broad and commanding subject; the colleges of agriculture must continue to meet the situation, and they must have well-trained men and big men.

Perhaps I have often enough expressed my convictions in respect to the subjects connoted in this introduction, but I am not averse to making one last excursion into them. I shall make a leisurely excursion, for I want to get the view. I shall go a good ways around, but I shall get home in the end.

I shall ask you to look at (1) the necessity of developing a spirit of scientific inquiry; (2) the necessity of letting one's work propagate itself; (3) the necessity of developing an incentive of self-help in one's constituency; and (4) the necessity of insisting on a certain kind of preparation in college.

I. THE NEW LEADER MUST HAVE THE SCIENTIFIC SPIRIT.

The college that trains him inoculates the spirit into a man. I speak of spirit before I speak of the curriculum, because it is the more important. The teacher or the investigator sent out by the college of agriculture is to discover and know the truth, and then to found his statements on it. It is permissible that his statements be clever and entertaining in their method, but they will be founded on fact and on reasonable deductions from fact if they are worthy of him.

These sentences may seem to be mere trite statements; and therefore I shall enlarge on them, for I am convinced that if the colleges of agriculture do the work they are called to do we shall develop a new order of rural government and a new purpose in rural civilization. What I am now about to say is not framed so much for those who have arrived at responsible positions in the institutions as to make suggestions to such young persons as contemplate engaging in country-life work. No person is prepared for college and station work who does not possess the scientific spirit.

It is very difficult for any of us to divest ourselves of tradition and of the notions that have come with us from birth or from childhood. Most of us have positive opinions on a great many subjects on which we have no real knowledge whatever. I often say to my students that they come to college with a

^a In this paper (as elsewhere in my writings) when I speak of colleges of agriculture I have in mind the agricultural side of the work of the land-grant colleges, or of any institutions of similar purport (as those in Canada), and irrespective of whether they are connected with universities or stand by themselves. Of course I do not mean to say that the work of the land-grant college should all be agriculture, for, by law, these institutions must include the mechanic arts and other branches of learning related to our fundamental industries. I have no kind of desire to magnify the agricultural work over the mechanical and engineering work that they are under equal obligation to perform; I speak of the agricultural side because it is my subject and because I have given no attention to the other side.

whole body of notions and opinions, and the probability is that every one of them is wrong. The larger part of the maxims and "wise saws" by which we guide our lives are probably either untrue, only partially true, or are misleading and unsafe as guides.

We are living in a time when it is considered to be right for a man to inquire, to see for himself, and to draw his own conclusions, for there are many things to find out, and the human mind is inquisitive.

We are living in the epoch of evidence. News gathering and gossiping aside, we do not depend on hearsay, nor on opinion, but on the fact and the reasons. We want proof. We are asking what truth is, and then we are not assuming that it is this or that, but are demanding the fact rather than a statement of the authority of any man.

We are living in a time when we are not afraid of our own conclusions. Men have been under bondage to other men from the first. They have been under bondage to the king or ruler, to the priest, to the capitalist, to the politician, and to current public opinion. Gradually we are passing out of our bonds and are becoming free. We now enjoy physical freedom, but relatively few persons in the world are really free to think as they will or to draw their own conclusions. While they may not know it, very few persons really want to know the truth. Very few, relative to the whole number, have open minds.

Our conclusions should follow naturally as a result of a line of work, and it matters not whether anybody is pleased with them or not. An honest man can withhold nothing in the search for truth, nor color his opinions for any person or for any benefit to himself, or detract anything except on new evidence or a new consideration of the subject. When he arrives at a conclusion, he speaks; and when he speaks, he stands.

We are living in a time of integrity of thought. By this I mean that we follow our thought out to its logical end, and that we do not in any way modify or shade our opinions in order to meet anybody's preconceived notions or to fit our ideas into the frame of thought of our time. It is the obligation of the investigator to know no other criterion than truth. If fame attracts him to modify his opinions, he is not a scientific man. If he modifies or understates or overstates his scientific conclusions because he is afraid of them, or because he desires to win favor anywhere or with anybody, then he does not have a really scientific mind and does not have integrity of thought, and he is not honest. He does not go where the truth leads him. Darwin wrote well toward the end of his life, "I am sure that I have never turned one inch out of my course to gain fame."

That is, we are beginning to think as individuals, and not as masses. I do not mean by this that men are to work wholly as individuals, for it is only by community of effort that we can expect to accomplish the best results for each other and for the world. By removing extraneous interests, the spread of the scientific spirit should enable men and women to work together without conflict, and it should develop a fine idealism. I know that the scientific man is often hard and lacks resiliency, but there is no necessity that it should be so.

Now, if this spirit were to guide all men it would revolutionize all our business; for a large part of the business of the world is essentially morally dishonest, even though it may conform itself perfectly to the statutory law. It would also revolutionize our politics, for it would take out of political operation the element of expediency and compromise which now dominates it. And it would shatter much of the theology that we now think we believe.

There is just as much need that we develop politics and government on a scientific method as that we develop chemistry, or botany, or physiology on that method. It is first necessary actually to study the conditions and to determine what are the real facts; then on these facts to establish a constructive procedure and to let the whole question of favor and of patronage be forgotten. Government by patronage and by influence is a phase of an undeveloped and dishonest society. Only as we found government on evidence and develop it in the scientific spirit can we expect to have really good government, or to make the best progress in civilization.

There is a peculiar disagreement of method in the work of many men as between their week-day attitude toward the world and their Sunday attitude. I see this in persons who are giving their lives to scientific investigation. They may be good scientists in their laboratories, in the sense that they search for fact and are exceedingly cautious not to express even an opinion that is not founded on evidence, and yet when they are out of their laboratories they accept the most impossible reactionary dogmas and theories which have no

foundation, so far as we can discover, in either fact or reason. I always distrust the science of such men; or at all events, a presumption is raised in my mind as to whether a man who does not have complete integrity of thought on one subject is likely also to have it on another. I recognize, of course, that in science and elsewhere we must accept much on faith; but the faith should be reasonable.

The scientific man never sets out to prove anything. He starts out to find what is true. He divests himself of all preconceived notions as to what the result is to be. He merely wants to know what is the fact, and if the fact that he discovers to-day contradicts the fact that he discovered yesterday, or even contradicts his own public statement of yesterday, he is the first man to acknowledge and to publish the contradiction; and he finds as much satisfaction in the discovery as if he had not made an imperfect conclusion the day before. I knew an experimenter who was very much disappointed that his experiments did not prove his theory, and he therefore discarded his experiments. I knew another who refused to undertake certain experiments because he was afraid that they would disprove the Bible. It is really a rare quality in a man that he is able to withhold his conclusions until he has all the evidence. I am afraid that most of us draw our conclusions and afterwards begin to prove them. That is, we prejudice, or are controlled by prejudice.

These remarks ought to have application to everyone of us whether we are investigators or not, and whether or not we are following a business that is founded on scientific fact. Our type of mind determines our attitude toward the world in which we live. There are very few of us, I am afraid, who have a perfectly rational and natural outlook on the world of nature. We are inclined rather to look on the forces of nature as in antagonism with us rather than to put ourselves directly into line with nature and try to work with her rather than against her. It is interesting to catch this note through all the history of mankind and in our literature. The thunder, the lightning, the storm, the wind, and much else, have been thought of as forces which are by nature opposed to us and with which we must necessarily contend. This idea, whether consciously or unconsciously, has entered into our customary attitude of life and is expressed in our poetry, our dogmas, and in our creeds. I should like to do something, if I can, to enable mankind to overcome the traditional and theological fear of nature.

Our traditional idea of God as a ruler who sits on a distant throne and manages the universe is another expression of our unsympathy with nature, because we put God above, beyond, and outside of nature. The modern outlook is to recognize God in nature.

The beginning of all real rural development is a rational outlook on the part of those who live in the open country. Country people must interpret nature from cause to effect rather than by tradition, notion, or prejudice. The colleges of agriculture and experiment stations are doing just this for country people. Beyond all "practical" application of the work of these institutions is the new and open-minded attitude that they develop on all problems under discussion. They banish all guessing, all moon farming, and all think so. The farmer is now willing to learn and to cast old notions aside; and for this reason the world is becoming a new world to him and he is beginning to understand his situation. As rapidly as he understands his situation he will master it.

If, now, I have estimated my premises properly, it follows that the attitude of the young leader toward his work is just as important as the work itself; and for this attitude his instructors are in large degree responsible. We are not training advocates, to found a case on part of the evidence; we are not training debaters or argumentarians, to found a position on an assumption; we are not training politicians, to found an action on the chance of securing office. We should be a plain people, saying what we have reason to know and speaking without guile.

The spirit of science, conjoined with spiritual forces, will eventually civilize the world.

II. WE SHOULD BE WILLING TO LET OUR WORK PROPAGATE ITSELF.

Every good leader is enthusiastic. It is a quality of leadership that its own interest in the work is contagious.

But there is great danger that enthusiasm has a narrow view and does not see all the sides and parts of a question. This danger is likely to be intensified

by narrow special courses pursued when the person is young. The great value of what we call a broad foundation lies in its influence in enabling a student to see the relation of one subject to another rather than to immerse him into one subject. I should prefer that the intending teacher or experimenter in agriculture have a good arts and science course in at least his first two years than that he be put into "agricultural" subjects in order that he may not lose interest in them. If he is in danger of losing his interest in agriculture in these years of preparation, society can well afford to stand the loss.

But what I intend most to say is that we may well rest content that our work will propagate itself if the work is well done and enthusiastically presented. We do not need to invoke extraneous aids to bolster or boost the work. The teacher or investigator is under no necessity to become a partisan for his department in order to make it "go." He does not need to buttonhole anybody. The person who develops a buttonhole type of mind is not likely to have a very highly developed science sense.

Education and investigation in agriculture have come to be a public function. They comprise the office of institutions and departments maintained by government, state or national, or both. Of all men, those who represent investigation by government should not be partisan; yet I am persuaded that we are developing a dangerous attitude in the pushing of such work. All government inquiry in the interest of agriculture is scientific inquiry in its last analysis. The persons who represent it should take the attitude of scientific men, and should not feel called on, in order to establish themselves in a region or a subject, to proselyte, or to act as if they were agents of commercial establishments engaged in drumming up business.

The growth of their work must rest on the excellence of it, and on their enthusiasm and enterprise in performing it.

III. THE ATTITUDE TOWARD CONSTITUENCY.

The good agricultural worker must have something of the missionary in him. He must know enough of the farm conditions to have the farm point of view, and possess enough human interest to make him desire to help everybody. Yet he must understand that his best work with his state or national constituency is that which inspires his constituency to help itself. His mission is not to carry people, but to enable them to walk alone.

A society of ginseng growers recently made a purse to call in a plant pathologist to make investigations of ginseng diseases. This illustrates a very important principle. The college of agriculture or the experiment station of the State can not find the funds to meet all the difficulties in the State, and the people should be willing to contribute money for the solution of the problems of their special business or region. It is no doubt the part of the institution or of farmers' institutes or other agencies to set backward neighborhoods into action, but it does not follow that the institution should forever carry the neighborhood or industry. As a neighborhood becomes prosperous it should be glad to help those who are less fortunate.

If a stock-growing community is perplexed by a feeding problem or a pear-growing community is injured by pear blight, let the people unite and call the best advice. If investigations are needed that the college or experiment station can not undertake, let the people collect a purse of, say, \$600 a year for two or three years and have the institution send a special postgraduate or advanced student into the region to work the problem out under the immediate direction of the college authorities. This would give the locality the benefit of the most expert help at the minimum cost, and it might be helping a needy and worthy student at the same time. In this way the locality could have the distinction and satisfaction of maintaining what would be practically a scholarship or fellowship, and the people would become active cooperators in the public work of the State. In very many cases this method would be far better than the common practice of running to the legislature with every difficulty, and it would eliminate the necessity of depending for betterment work on the politician and officeholder. It would strongly develop the ability of self-government.

It would also seem that the responsibility of proving the worth of their goods should rest on the firms who make the goods rather than on the college or the experiment station. An experiment station is under no obligation to test seeds or new plants or a new spray mixture just because some firm, for the sake of profit, has put the materials on the market.

It does not follow because a county fair, a farmers' club, or a shipping association asks the college of agriculture or experiment station to send exhibits or a lecturer or an investigator that the institution is under obligation to do so. It may be quite as important that the local organization "prove up," show that it deserves the help, that it will take pains to cooperate and to execute the work. I have known many cases in which the people in the locality sit idly by or look on in curiosity while investigators work hard to throw light on a local problem, and I have gone back into the community years after to find the same difficulties and to hear the same questions as to cause and remedy. This is not fair.

My argument is that those who are in training for college and station work should be interested to understand how their special work will react on the social structure of the community and what psychological effect it will have on the people. The worker must always and always have before him the idea that he is making it possible for his people to think out their own problems and to help themselves. It is easy for him to advise them to go to the legislature or to Washington, but he must be careful that he does not weaken them thereby.

The rural community is inert, chiefly for two reasons: It does not have knowledge; it does not have social cohesion. The community comes to be dominated by personal or parasitic interests. Rural government is probably as much dominated by graft and boss rule, in proportion to population and opportunities, as is city government.

Rural communities need to have their local fact incorporated into their social structure. As agriculture rests on scientific fact, so is it fundamentally important how this fact is worked into the web and woof of the community life. The scientist, speaking broadly, and not the politician, is the person who is going to make the greatest contribution to local rural self-government.

IV. THE CURRICULUM.

I come at last to the subject that you all have had in mind from the beginning, the course of study. I am getting in sight of home. You all know the place so well that I need not have to say a few formalities at parting.

I think that the point of view is the first consideration—the curriculum is one of the means of working it out.

In looking over a number of catalogues of universities I was struck by the few persons with less than a doctor's degree who are teaching chemistry and physics, and with the great number not having such degree who are teaching agriculture in the same institutions. Many of the teachers in agriculture and home economics have no degrees. This does not prove that the persons in one case are inferior to those in the other. It is rather an indication of the lack of opportunities that have been at the disposal of the agricultural men for the pursuit of good postgraduate work in their special subjects. It is probable that by subsequent study and experience these officers, even if lacking advanced degrees, are now as well prepared as other persons for their work. The new generation will find better opportunities for preparation, and the attainments of the officers of agricultural colleges and experiment stations will find the academic recognition that they deserve.

In discussing the curriculum we must remember that the first duty of the college of agriculture is to train men by means of agriculture to be competent and useful citizens of the world and to meet the rural needs of its commonwealth. A college may serve its State ever so efficiently and yet not be prepared to train men and women for the higher positions as teachers and leaders. There must be special provision for the training of high-class specialists. Because a man has graduated from a college of agriculture it does not follow that he is fitted for a position in a college of agriculture.

My contention is that we have now come to the time when we must much more closely scrutinize the men who are to officer our colleges of agriculture and our experiment stations. We have now skimmed the surface in agricultural investigation, taking off the apparent and the easy subjects. The constituency is rapidly rising in intelligent appreciation of what we do. We must now go deeper, attack the essential underlying problems, teach more fundamentally. The college of agriculture can now set its standards and let the people rise to meet them. This must come about through officers who are very carefully trained for their duties.

I will state a few specific considerations that I think should govern in the training of persons for college and station work. I have in mind the work in

home economics, as well as in agriculture proper. Of course, such regulations can not apply equally to all persons or in all subjects. Persons may appear who will be above and beyond all regulations, so marked by nature for particular kinds of work that the routine preparation may not be essential for them; but rules are never made for the exceptions, and, moreover, these exceptions will be so very rare that we do not need to consider them in a paper like this.

(1) We must allow our men to mature and ripen to some extent before placing them in full charge of very responsible work, and especially before sending them far away from home. The demand for men is so great that it is difficult to do this, but there is need that we make the effort.

(2) We must appreciate the value of the time element in the training of persons for college and station work. There may be short courses and short cuts for other students, but there should be no short cuts for those who would fit themselves for teachers and experimenters in the colleges and stations.

(3) The person who would fit himself for such work should have the equivalent of a good high-school training, and he should be a regular graduate of a four-years' course founded on such preparation.

(4) He should then have a thorough post-graduate training. He ought in the future to have at least an earned master's degree, and the time ought soon to come when he should have an earned doctor's degree. I know that we can not yet insist on all this, but I think that we should begin to set these prerequisites for all heads of departments. It has not been possible to accomplish this up to this time, both because of the rapid demand for men and the lack of opportunities to secure these degrees in agricultural subjects.

(5) In order that a post-graduate degree may mean something, it is important not only that the post-graduate work itself is good, but that only those persons be allowed to candidacy who give evidence of being intelligently able to pursue the work with satisfaction. It does not follow that because a student has secured his bachelor's degree he may therefore demand as a right that he pursue graduate work in any subject; the officer in charge of that subject should have the right to refuse an applicant who is clearly too weak to make a good teacher or investigator in the subject. In practice the weak men are not usually weeded out in the final examination for the degree. Persons who would pursue post-graduate work merely because they can find nothing else to do should be eliminated.

(6) This means (if a man secures his doctorate) that he can not be through with his training short of 23 years, assuming that he enters college at 16 years, which is the earliest age. But even the twenty-third year is too young for one to have completed a doctorate. If the candidate is so unfortunate as to have entered college at 16 years, it would be better for him to drop out a year or two after graduation and engage in such work as will give him experience in life. In fact, it is usually advisable for the general student to enter on his post-graduate work with more experience than a college course alone can give him.

This deliberate preparation would do much to give us the mature men that we so much need. Such men are specially needed in agriculture, because people follow their advice in the making of a living. A person who accomplishes anything in the world will make errors, but some kinds of errors are more serious than others. It would not matter very much if one made a bad blunder in the study of sun spots, but to give wrong scientific advice on the raising of wheat or the growing of apples or the rearing of live stock is a grave responsibility.

Before a person is allowed a post-graduate degree in agriculture I think he should have covered at least the following preparation:

(a) A usable knowledge of at least French or German.

(b) Enough of physics, chemistry, physiology, biology, geology, meteorology, to enable him to understand the bearing of his work, and to guard him from fundamental error.

(c) A usable interest and understanding in the social and economic phases of country life.

(d) Sufficient actual contact with farm work and farm life to make him competent to estimate the farmer's position and to judge the rural mind.

(e) And he should have completed a piece of personal investigation of a character that calls for the exercise of much more talent than merely the ability to be industrious and to compile.

There is now opportunity to secure the necessary preparation in the chemistry and the physiology and the pathology that underlie our work; but in the applications of these things to life there are not yet adequate facilities for the training of men and women for college and station work nor I fear, sufficient appreciation of the importance of it. This is marked in such subjects as animal breeding, dairying, horticulture, poultry husbandry, farm mechanics, rural architecture, rural education, rural economy, and, above all, in what we call home economics. I gave the best of my life to one of these applications, but I did not see the whole problem then. My estimate is now a backward look; but I rejoice to see the good young men and women coming on.

I have now traversed my field, just for the pleasure of seeing how it lies. I have pointed out some of the most apparent things. It is a beautiful field that we travel in, this broad field that I like to call "the open country." In it are all the possibilities of man's desire; it is ours to develop and establish them. We will make it the equal of any other field of man's effort. We do not need to be in haste. We need more than all to be prepared for our work, that we may see correctly, think straight, work together as brothers, and have in mind the best good of all men. We shall all contribute our best performance, each in his special way, but we shall do it with all the field before our eyes and with a proper understanding of our part in the whole enterprise.

I have made this journey unexpectedly, but I have had good company, and I thank you all for going with me.

The association adjourned until 10 o'clock a. m., August 19.

MORNING SESSION, THURSDAY, AUGUST 19, 1909.

Vice-President Kerr called the association to order at 10 o'clock a. m.

CONSERVATION OF OUR NATURAL RESOURCES.

L. G. Carpenter, of Colorado, read the following paper on this subject:

Recently much attention has been given to our natural resources, to the imminent danger of their exhaustion, and the fearful calamities that would happen to our descendants, mostly in the remote future. I would not lessen the attention that has been given, for it has exercised a useful purpose and has been of great benefit in causing the arrest of attention and a sober thought to be given to a study of the tendencies of production and of consumption. At the same time I am not impressed with all of the somber colors of the painting. One is struck with the supreme confidence of the prophets in their complete knowledge of present resources, the boldness with which they dismiss consideration of any possible developments of which they do not know, and their evident belief that the coming generation will be a helpless and resourceless lot, not capable of solving any problems which we of this generation can not see. It is not so long ago as to be forgotten when a celebrated gentleman determined to his satisfaction that because the human race increased in geometrical proportion while the production of human food increased in arithmetical ratio, that therefore the time would soon come when the race would suffer from starvation, and that therefore it was the duty of the intelligent and the public spirited to prevent this catastrophe. To this day the descendants have continued to increase, and never before has there been more abundant food supply than to-day. The prophets in such cases have been satisfied with the sufficiency of their own knowledge, have tacitly assumed that discoveries have ceased, and that the condition of practice and of knowledge remains as it is to-day and is measured by their own information.

Their mistake has been in omitting consideration of the one most important resource. This is the present and acting human will and enterprise, the power to surmount obstacles, to change conditions, to discover and adapt new means—a tenacious, intelligent, resourceful will. Progress is always coming to the end of its road, and then a sudden turn, due to an additional discovery or a new resource, shows the road continuing in another direction and again without end until another obstacle will be reached and passed in the same manner. But even in the case of any given resource, it is again assumed that we know all of the existing supplies, an assumption that it is safe to say is generally untrue. Even within a year in the case of some of the natural supplies which were

thought to be near extinction additional supplies have already been discovered and the estimate of the time of extinction is correspondingly further removed and we are comforted with the assurance that we have a longer period of activity. We are making adaptation of new processes and discoveries. Not many years ago there might have been the fear of darkness in the home, for cattle could not furnish tallow for the growing need—the whale was disappearing. Then with the adaptation of coal oil came the alarm concerning the exhaustion of the oil supply. Then arises the adaptation of the electric current, and this again is being utilized so as to furnish many times the same light for the same energy that it could a few years since. It is only an illustration from a common matter of information that the human mind under the stimulus of necessity or self-interest finds new methods unsuspected before. These steps are not seen by the common mind until they are put in application; but there is no reason to suppose that this process is ended. It is largely an economic question. When the need is sufficient and hundreds and thousands of minds are working on the problem, then it is only a limited time before some solution is found. We are already seeing the increasing substitution of cement for wood. It is already a commercial possibility to produce cement at such cost that for many purposes it is cheaper.

Hence, while we may sympathize most heartily with the objects of conservation and especially with the attempt to restrain speculative uses, I do not think it follows that there is any necessity of a needless panic. On the other hand, there has never been a time when there is so much reason for optimistic faith in the future or in the meeting of the problems as they arise. A failure in such faith is generally due to a lack of knowledge or of fundamental faith in a beneficent providence and a resultant feeling that the individual must shoulder the responsibility of thinking for the race.

Can it be that some of the pessimistic feeling that the country is extravagant in the use of its resources, is going to the dogs generally, is an evidence of the same tendency of men of middle age or past to believe that times do not compare with those of their youth in care, thrift, good qualities, virtue: a universal tendency and one which the Italian historian Ferrero, in a striking chapter, has assigned as the principal cause for the bad reputation which has come down to us of the Romans and their extravagance?

Many who have discussed the subject assume an attitude that most can not accept, and that is that saving is in itself an object, and therefore that to prevent or restrict use or put difficulties in the way with the object of preventing use is in itself commendable. Such a view is not infrequent, and especially among custodians, who come to look upon their positions of trust as ends instead of means; so that it is not infrequent to find librarians, for example, who feel that their duty is to preserve books and to be jealous of their use.

On the contrary, the highest use is use, and the best conservation is that which contributes to the increase of our comfort, happiness, or efficiency. This, however, should not sanction waste, but waste is always relative. Preservation may be as unnecessary as waste, and wanton preservation is worthy of condemnation as much as wanton waste. Conservation should not mean nonuse, but the highest use. It should be utilization rather than preservation, and the only justification which I can see in conservation, as often described, is that it may promote utilization. It should result in the lessening of waste. This, it should be remembered, is an economic question. There is always a balance of the opposing, conserving claims. One may be the conservation of the material, but, on the other hand, is the conservation of time or effort or energy, and this may be far more important than the material. This almost always comes back to the human element. Much is bound to be wasted and can not be otherwise. There is an increase in prevention of waste and the limit of waste is bound to vary at different times. At the point when the prevention of the waste of material may mean a waste of energy then is the point when it becomes economic loss to attempt to prevent further waste, or else it forces new processes and methods. We can not lose sight of the fact that it pays to waste and always will, though what this may be varies with the conditions and almost varies from day to day.

In the consideration of resources attention has been given almost entirely to two or three, and the fearful pictures made of these have been applied to other resources as well. There is, however, a distinction between the classes of these resources. Some, as coal, are consumed by the using, and when once used are gone, and therefore these would need more careful attention because their use

may mean the end of that particular resource, and we may be hampered unless new means of meeting the deficiency are discovered.

Such materials as iron or gold, on the contrary, are not consumed in the using, except to a small extent, and may be used over and over again almost indefinitely. Other natural resources, such as the growth from soil, are replaced in a moderate time.

The economic condition would lead in the case of coal to new substitutes or to the development of other sources of power. In the case of gold or iron or other metals, it might lead to the discovery of means of using present neglected resources, either by the discovery of new methods or by the increase in value which would justify the application of methods which are now economically impractical at the present prices. In the case of crops like forests, if substitution does not take place just so soon as there is a commercial benefit, or in other words when the price justifies the growth of the crop, then it will be taken up by hundreds of thousands of people as a definite, marketable crop.

Hence, while this discussion has caused much anxiety and should give serious thought to the persistence of our resources, it is not necessary to be alarmed.

Beyond these resources commonly mentioned we have others of far more importance which have greater value in the national wealth, which we have scarcely as yet touched, and which the work of this association tends to render more useful. Such are all the multifarious uses of the soil, the growth of the national wealth from this source. At no time have we understood so well how to retain the fertility and to maintain it in a high stage of production. We can find much to complain of, but still more for hope.

Another resource which has been almost untouched is water in agriculture. I do not mean water power, for that is relatively small. Our arid States have shown the value of water for irrigation, but only second to this is the correspondent value of water in a humid country where the rainfall is not distributed so as to be of the most value agriculturally. It can be used in New England as well as the Valley of the Willamette and the Snake, and the returns in central New York and Massachusetts might double the agricultural returns for large areas, irrespective of other considerations. This, again, is a question of whether it would pay.

And still the most important of our potential resources which I will only mention, and yet is proper at this association, is the youth of our own people. Whatever be our resources, whether they be as great as those of Africa or of Asia, they are of little value without an intelligent, energetic, and resourceful people. With them new resources will be discovered if necessary, their lack supplied. The cultivation of this resource is one of the objects of our body, and more important than any other single one.

In closing this imperfect presentation of one phase of this subject, and while some sides have not been mentioned, yet as a whole and in detail I can not share in the serious view so many of our current writers take of our immediate future. There are changes to take place, but we are wise in our own conceit to think that we know the bounds of our own world or our own limitations. The buffalo has gone, but in its place have come many times as many cattle and thousands of homes. Other supplies may end, but others will be found. At any rate I feel that while a careful outlook should be kept, as a nation and as a body we may accept the advice given to the young man hero in one of Longfellow's romances:

"Look not mournfully into the past, it comes not back again.

"Wisely improve the present. It is thine.

"Go forth to meet the future without fear and with a manly heart."

REPORT OF COMMITTEE ON EXTENSION WORK.

The report of this committee was presented by K. L. Butterfield, of Massachusetts, as follows:

I. SECTION ON EXTENSION WORK.

Your committee repeats its recommendation of a year ago, that there should be organized in this association a section on extension work. It is believed that such a section would accomplish the following results:

(1) It would at once elevate the extension work of the land-grant colleges to the place where it belongs—a line of endeavor coordinate with that of research through the experiment station and that of teaching through the college courses.

(2) It would immediately suggest to all the land-grant colleges the supreme desirability of organizing extension work in a way commensurate with its dignity and with the need for the work.

(3) It would bring into the ranks of this association the active managers of extension work, who have already formed an organization of their own. We need these men for the good of the colleges, for extension work can not safely be separated from the other work of our institutions.

Objections have been raised to the formation of such a section. Some of these are discussed briefly:

(1) Even if desirable, the time is not ripe for it.

It seems to the committee that we are fully ready for the organization of such a section, simply because the time is ripe for a complete recognition of this field of work and for its thorough organization. That this association is the proper body to take cognizance of these facts and to give the initiative to the movement admits of no debate, in our judgment.

(2) It would separate important discussions from the main program of the association.

Your committee believes that extension subjects are not likely to be discussed adequately in the main program of this association. It has many other things to discuss. Especially in the initial stages of extension work it is important that details be thrashed over and over again by the workers themselves in order that fundamental principles may be worked out from the chaff and eventually displace mere empiricism. We see no more reason why a section on extension work will result disastrously to our main program than is the case with other sections. It is not the function of your committee to outline methods of procedure for the annual meeting of this body, but we venture to suggest that sections designed respectively for the experiment station, for the college, and for extension work may well discuss the details of all problems which arise in the work and administration of those particular phases of our institutional work, and that the main program may well be reserved for the discussion of the larger implications of our field of thought and activity; in other words, for the study of agricultural education in its larger aspects, and for the consideration of the problem of coordinating these lines of work, and of relating them to the general movement for educational progress.

(3) It would raise the question of eligibility to membership in the association of managers of extension work.

The easiest solution of this difficulty is to make these men definitely eligible to the association.

II. NATIONAL APPROPRIATION FOR EXTENSION WORK.

Your committee also renews its recommendation of a year ago, in favor of a national appropriation for extension work, made under such conditions that state aid shall be absolutely requisite in order to secure any substantial amount from the federal treasury. Later in this report your committee will outline more fully its reason for this recommendation.

III. FRANKING PRIVILEGE.

The committee also renews its recommendation of a year ago for the granting by Congress of the franking privilege to bona fide extension publications.

IV. EXTENSION DEPARTMENT IN EACH COLLEGE.

Your committee has recommended for three successive years, and now repeats the recommendation, that there be organized in each land-grant college a thoroughly equipped plan for extension work. The colleges are gradually falling into line with this plan, but the movement is making slow progress.

We are more than ever impressed with the necessity of developing the thorough organization of the work and with the crying need for the work itself. Nearly every land-grant college is doing work of this character, but in most cases it is unorganized, chaotic, without large plan, and, as a rule, we venture to say, grossly inadequate to the needs of the working farmers of the respective States.

It has been suggested that your committee outline a practical plan by which this organization could be undertaken. Without going into any detail, your committee makes the following suggestions:

(1) That every land-grant college appoint a director of extension work who shall give all his time to this line of endeavor.

(2) That sufficient salary be paid to secure a man who is well equipped for the place, and that he be given substantial funds at the outset.

(3) That, whenever possible, he be given assistants, either one or more men who can give all of their time to extension work and act as "field agents," or have at his disposal the partial time of men who are connected with the college or station staff.

(4) That the first work to be done should be that of organizing those methods of extension work which are already in vogue at the college. Nearly all the colleges have large correspondence with farmers, send out publications which are in the nature of monographs on practical subjects, give lectures before granges and other local organizations, and hold demonstrations. We would advise that all of this work be unified and put, so far as the administration is concerned, into the hands of the director of extension work. It may be desirable temporarily to have even the short winter and summer courses offered by the institution placed under the same management, although, strictly speaking, these enterprises are not extension work. It is exceedingly important that men assigned chiefly to extension teaching, while immediately responsible to the director of that work, shall also have equally close connections with those teaching departments of the institution in which their special subject naturally lies.

(5) We would then go so far as to suggest that those activities of the experiment station which are not primarily connected with research or experimentation, but which are really designed to give popular dissemination to general agricultural information, and which so burden the time and energy of most of our station workers, should as rapidly as possible be given over to the general direction of the director of extension work.

(6) Finally, and most important of all, we would urge upon the director of extension work and the administration of the institution the prime necessity of getting into the public mind a thorough understanding of what extension work is. It is not a scheme to advertise the college. It is not a plan to trap students for the college, or even to get boys and girls interested in agricultural schools and colleges generally. It is fundamentally a means of teaching the people out of school about agriculture and country life in all its phases. It is an educational proposition. Its aim should be to reach every farmer and his family.

V. A CAMPAIGN FOR RURAL PROGRESS.

There is another phase of this movement for disseminating popular information about agriculture which has a very direct bearing upon the extension work of the agricultural college. It has become evident that while the work of our experiment stations, colleges, and farmers' institutes, in preaching the need of better methods of farming, and in seeking to discover and impress the great fundamental principles of agricultural production upon the people, is a work absolutely essential to agricultural progress, nevertheless we have heretofore placed the emphasis too exclusively upon the business of farming, and have not sufficiently emphasized the social or human aspect of the problem.

Furthermore, the various institutions engaged in work on behalf of our agricultural industry or rural people have labored very much by themselves. There has been a very slight measure of cooperation between rural church, country school, grange, club, agricultural college, and library.

There is now a clear thought that these two defects in our agricultural propaganda must be remedied. Without lessening in the slightest degree our efforts for more scientific farming, we must emphasize as never before the development of a better personal and community life in our agricultural districts and we must attempt in some way to bring together those various institutions and agencies designed to serve rural life which have hitherto worked apart.

A very suggestive pattern is found for this work in the new movement for "city planning." The idea of city planning originated with landscape gardeners, and was designed for the beautification of our cities; but the movement has already grown far beyond any question of esthetics, and embraces a consideration of the whole range of moral and social life. It is exemplified in the

"Boston 1915" movement, which is attracting so much attention in the East, and which is nothing more nor less than a definite propaganda for the unification of all interests in that great city on behalf of a broad-gage campaign for urban progress, not only industrial and esthetic, but moral and social.

Now, the counterpart of this city planning may be expressed in the term "a campaign for rural progress." For several years this idea has been gaining ground in some States, and a number of conferences on rural progress have been organized. Three New England conferences on rural progress have been held in the city of Boston, and representatives from all of the New England States and their agricultural colleges and experiment stations, state granges, state boards of agriculture, state departments of education, state federations of churches, and other bodies have been present. There has been admitted to membership in this conference a list of about 70 institutions and organizations in New England, representing all possible phases of agriculture and rural life—technical, industrial, economic, educational, social, and religious. We have here, then, a type for a new movement in rural life, which is nothing more nor less than that of bringing to bear upon the development of the agricultural industry and the rural community the work of all those individuals and institutions that are concerned with the problem; and not only so, but of having withal a definite plan and goal for all this broad work.

Now, this idea of a campaign for rural progress is tied up intimately with the idea of the proper development of extension work in the land-grant colleges, because the function of extension work in a land-grant college is not only to impart knowledge, but also to give the college leadership in agriculture and country life. It seems to your committee as if the mention of these two great ideas—that American rural society is to plan its future, and that the agricultural college shall be the great organ of knowledge and leadership on behalf of this planning—suggests without further argument the prime importance of a great campaign for rural progress and the need of entering upon it at once.

VI. FEDERAL APPROPRIATIONS FOR EXTENSION WORK IN AGRICULTURE.

Your committee has already stated its recommendation for federal appropriations for extension work. In closing its report, your committee desires to outline with extreme brevity the character of legislation which it thinks desirable and the reasons for it. In the first place, we desire to mention a few general arguments for federal aid:

(1) It would stimulate the complete organization of extension work in our agricultural colleges.

(2) It would call attention to the importance of extension work, both in the college and among the people at large.

(3) It would give the movement a national character and significance. This is worth a good deal, because the work at once becomes a national concern, and not merely a question of state pride or efficiency.

(4) It would thus attract agricultural college students to the opportunity for a new career. Your committee believes that the proper development of extension work in our agricultural colleges means a new occupation for hundreds and perhaps thousands of well-trained men.

(5) Government supports a national system of agricultural colleges and experiment stations. This money, however, is not available for extension work, although extension work from our point of view is fully coordinate with the work of the college and station.

VII. A PLAN FOR A PROPOSED NATIONAL APPROPRIATION FOR EXTENSION WORK.

(1) Appropriate \$10,000 a year from the National Treasury to each State and Territory, for extension work in agriculture and rural life.

(2) Provide that at any time, after two years have elapsed from the date any State or Territory has accepted this appropriation and has actually organized extension work in connection with its land-grant college, there shall be available from the National Treasury, in addition to the amount named above, an amount of money, for each State and Territory, for the same purpose, equal to the amount appropriated by the legislature of the State or Territory for this purpose; provided, that the additional appropriation to any State or Territory shall not exceed an amount equal to 1 cent per capita of the total population of that State or Territory as shown by the last United States census.

(3) This appropriation should be given specifically to the land-grant colleges and only to them.

(4) Require each college to organize a "department" or "division" or "school" of extension work, i. e., to organize the work as a definite part of the institution.

(5) Confine the work for the present to agriculture, domestic science, and other phases of rural life.

(6) Define extension work broadly and yet closely. Define agriculture and rural life so as to include instruction and aid in any phase of this field—in subjects technical and scientific, concerning business management, home making, sanitation; and economic, social, and moral subjects. Indicate that extension work is for adults and youth and children, and for people in towns and cities as well as in the open country.

(7) Extend the franking privilege to bona fide extension publications, and permit the use of the federal appropriations for printing such publications.

(8) Also appropriate annually a substantial sum, perhaps \$25,000 to \$50,000, to the United States Department of Agriculture for investigation into and experimentation with methods of popular education in agriculture and rural life, in this country and abroad, for distributing the results of such investigations, and for making demonstrations thereof.

ADVANTAGES OF THE PLAN PROPOSED.

(1) This plan would give the program for extension work immediate national significance.

(2) There would be no delay because of a failure of the legislature to act, and the work on at least a small scale could be started in each State.

(3) It provides sufficient money to put the poor, backward, or small State on a good footing with respect to the work.

(4) It enables the States to develop the work as rapidly as seems wise to them.

(5) It makes the United States Department of Agriculture a clearing house for methods of extension work, and keeps it in close touch with the work in all the States and Territories.

(6) It gives adequate breadth and scope to the whole scheme, and prevents States from leaving out important phases of the work.

(7) If later needs warrant, the per capita amount can be increased without other change in the law, and extension work in mechanic arts and in general culture subjects can be added by simple amendment.

(8) The amount of money immediately required is not large, and in fact when the act is in full operation will not draw heavily on either national or state treasuries.

(9) It divides the responsibility between national and state governments and completes the circle of national aid for the land-grant colleges on principles already recognized in the two Morrill acts, in the Nelson Act, in the Hatch Act, and in the Adams Act.

(10) It recognizes and supports the great movement for making more fully available to the mass of working farmers the results of the research and experimentation of the stations established under and fostered by the Hatch and Adams acts, and the organized teaching and inspiration of the agricultural colleges supported by the Morrill and Nelson acts.

VIEWS OF THE COMMISSION ON COUNTRY LIFE.

The position of your committee with respect to the development of extension work and the appropriation of federal funds to assist the States in carrying on this work finds substantial support in the report of the Commission on Country Life. This commission had unusual facilities for securing the opinion of the farmers of the country with respect to the chief needs of the time in the development of agricultural and rural life, as well as a unique opportunity to draw conclusions with respect to the fundamental principles of an advanced movement on behalf of American agriculture. We therefore desire to quote from that part of the report of the commission, as presented to the President, bearing upon the development of extension work on a national scale:

"We find a general demand for federal encouragement in educational propaganda to be in some way cooperative with the States. The people realize

that the incubus of ignorance and inertia is so heavy and so widespread as to constitute a national danger, and that it should be removed as rapidly as possible. It will be increasingly necessary for the national and the state governments to cooperate to bring about the results that are needed in agricultural and other industrial education.

"The consideration of the educational problem raises the greatest single question that has come before the commission, and which the commission has to place before the American people. Education has now come to have vastly more significance than the mere establishing and maintaining of schools. The education motive has been taken into all kinds of work with the people, directly in their homes and on their farms, and it reaches mature persons as well as youths. Beyond and behind all educational work there must be an aroused intelligent public sentiment; to make this sentiment is the most important work immediately before us. The whole country is alive with educational activity. While this activity may all be good, it nevertheless needs to be directed and correlated, and all the agencies should be more or less federated.

"The arousing of the people must be accomplished in terms of their daily lives or of their welfare. For the country people this means that it must be largely in terms of agriculture. Some of the colleges of agriculture are now doing this kind of work effectively, although on a pitifully small scale as compared with the needs. This is extension work, by which is meant all kinds of educational effort directly with the people, both old and young, at their homes and on their farms; it comprises all educational work that is conducted away from the institution and for those who can not go to schools and colleges. The best extension work now proceeding in this country—if measured by the effort to reach the people in their homes and on their own grounds—is that coming from some of the colleges of agriculture and the United States Department of Agriculture. Within the last five or ten years the colleges of agriculture have been able to attack the problem of rural life in a new way. This extension work includes such efforts as local agricultural surveys, demonstrations on farms, nature study, and other work in schools, boys' and girls' clubs of many kinds, crop organizations, redirection of rural societies, reading clubs, library extension, lectures, traveling schools, farmers' institutes, inspections of herds, barns, crops, orchards, and farms, publications of many kinds, and similar educational effort directly in the field.

"To accomplish these ends we suggest the establishment of a nation-wide extension work. The first, or original, work of the agricultural branches of the land-grant colleges was academic in the old sense; later there was added the great field of experiment and research; there now should be added the third coordinate branch, comprising extension work, without which no college of agriculture can adequately serve its State. It is to the extension department of these colleges, if properly conducted, that we must now look for the most effective rousing of the people on the land."

Respectfully submitted.

KENYON L. BUTTERFIELD,
C. R. VAN HISE,
W. C. LATTI,
C. F. CURTISS,
ANDREW M. SOULE,
W. M. HAYS,

Committee.

The recommendations contained in the report were referred to the section on college work and administration for consideration. Later the section reported its approval of the report with the understanding that only the general idea of a federal appropriation was considered, and the report was adopted.

For further action, see pages 45, 46.

STATUS OF THE SEPARATE LAND-GRANT COLLEGES.

Howard Edwards, of Rhode Island, introduced certain resolutions emanating from the section on college work and administration and relating to the status of the independent land-grant colleges, which were referred to the executive committee under the rules. See page 43 for action on this matter.

REPORT OF COMMITTEE ON INSTRUCTION IN AGRICULTURE.

The chairman of this committee, A. C. True, presented the following report:

Since the Washington meeting of this association in November, 1908, subcommittees have been engaged in preparing a four-year course in home economics and a one-year course in animal husbandry and dairying for secondary schools. The subcommittee on home economics, consisting of H. T. French and H. C. White, with the aid of a college teacher of home economics, has prepared an outline four-year course in home economics.

The subcommittee on animal husbandry and dairying for secondary schools, consisting of T. F. Hunt and A. C. True, engaged Prof. H. R. Smith, of the Nebraska College and School of Agriculture, who has prepared a series of lecture outlines, recitations, and practicums, concerning types and breeds of farm animals (horses, cattle, sheep, goats, swine, and poultry), the care and feeding of animals, milk and its products. This course is intended to be used in connection with text-books and bulletins to which numerous definite references are given.

The committee proposes to edit these two courses and publish them in confidential form in order to get criticisms and suggestions from numerous teachers, as was done in the case of a secondary course in agronomy, which has been published as Circular 77 of the Office of Experiment Stations.

The committee has also given some preliminary consideration to courses for the preparation of teachers of agriculture, with special reference to the work of agricultural colleges in this line, but is not prepared to report definitely on this subject at present.

A. C. TRUE,
T. F. HUNT,
H. T. FRENCH,
H. C. WHITE,
J. F. DUGGAR,
W. E. STONE,
Committee.

The report was accepted.

REPORT OF COMMITTEE ON HISTORY OF AGRICULTURAL EDUCATION.

A. C. True, chairman, presented the report of the special committee on this subject as follows:

I might state in a preliminary way that some time ago a special committee was appointed, consisting of Dean Davenport, Dean Henry, and myself, to gather documents and other data regarding the history of agricultural education. That committee has been at work along that line since that time.

Under the general arrangement made by the committee and approved by the association, the Office of Experiment Stations is the depository for documents and we already have a considerable collection. This report covers the work of the committee since the Washington convention.

As a result of the inquiry started in 1908 by the committee on the history of agricultural education several valuable historical documents have been received this year by the Office of Experiment Stations. Among these is an article by Paul Selby, of Chicago on "The Part of Illinois in the National Educational Movement, 1851-1862," and several papers from W. H. Brewer, of New Haven, including a copy of the prospectus of Oakwood Institute, which was opened at Lancaster, N. Y., in April, 1851, "for the reception of pupils of the age of 12 years and upwards," who "will be carefully instructed in agricultural chemistry, the analysis of soils, etc., by a pupil of Mr. Norton, professor of scientific agriculture in Yale College." The school also announced a course of instruction especially designed for practical farmers and young men from the country, to commence about the 1st of January and continue three months. This apparently was one of the earliest announcements of a short winter course for farmers, but the course was never given. A fire which destroyed the property of two of the chief promoters of the school caused it to be closed just before the short course was announced to begin. Professor Brewer has also contributed a copy of a manuscript prepared by him some time between 1888 and 1892 on "The intent of the Morrill land grant."

The committee has also received an important manuscript from J. N. Hook, of South Carolina, this being a statement dictated by Senator B. R. Tillman

setting forth his connection with the struggle (1885-1890) for the establishment of a separate agricultural and mechanical college at Clemson.

Through the kindness of F. W. Howe in preparing a manuscript of 48 type-written pages, the committee has been able to secure considerable historical data from the earlier reports of the Michigan State Agricultural Society and other publications concerning the agitation for the establishment of the Michigan Agricultural College, as well as earlier movements for including instruction in agriculture in the courses of study offered by the Michigan Normal School at Ypsilanti and the Michigan State University at Ann Arbor.

It appears from this manuscript that as early as 1849 the state legislature in Michigan instructed its "delegation in Congress to use all honorable means to procure a donation of 350,000 acres of land for the establishment of agricultural schools in the State," and Mr. Howe raises the question whether this action does not take priority over any other official action to secure a national land grant for the purposes of agricultural education. It is also shown from a letter written by the state superintendent of public instruction in 1852 to the secretary of the State Agricultural Society that the State Normal School at Ypsilanti, which was dedicated October 5, 1852 offered courses of "instruction in the mechanic arts, the arts of husbandry, and in agricultural chemistry," and from a letter written by the chancellor of the State University to the secretary of the State Agricultural Society that the university had organized in 1852 "an agricultural school as a part of the scientific course recently adopted by the faculty and regents," in which lectures were to be given during the spring and summer terms (1853) on the following subjects:

(1) Daily lectures on chemistry (elementary and experimental), chemistry applied to the arts, meteorology, and climate.

(2) Geology and mineralogy, and the application of the same to mining, drainage, construction of public works, etc., illustrated by specimens from Michigan, the neighboring States, and foreign lands; also models and drawings.

(3) Animal and vegetable anatomy and physiology in general, the physiology and diseases of domestic animals in particular, and the structure and habits of insects in reference to grain, trees, and horticultural plants.

(4) Organic chemistry and the theory and practice of agriculture, the origin and nature of the soils, the different varieties of manure, tillage, tools, etc.

The first professor of agriculture in the State University was the Rev. Charles Fox, rector of the Episcopal Church at Grosse Isle, near Detroit, who had been senior editor of the *Farmer's Companion and Horticultural Gazette*, and later, in 1854, published a "Text-book of Agriculture," which was the first agricultural text-book published west of the State of New York.

Mr. Howe's manuscript goes somewhat into the details of the struggles in Michigan for and against the establishment of the agricultural college separate from the State University; calls attention to the admission of young women students to the college in 1870, who "prepared seed for the ground, cut potatoes, transplanted tomatoes and flowering plants, pruned shrubbery, gathered small fruit, did some work in the greenhouse, and many other kinds of work;" and gives references to records dealing with the early efforts of W. C. Flagg, secretary of the board of trustees of the Illinois Industrial University, and Dr. Manley Miles, professor of agriculture in the Michigan Agricultural College, for the establishment of a society which was the forerunner of the Association of American Agricultural Colleges and Experiment Stations. Ninety-eight pages of the report of the Michigan State Agricultural Society for 1871 are given to the discussions had in the first meeting of this society, held in Chicago, August 24, 1871, which were participated in by such men as Doctor Miles, Professor Swallow, Prof. John Hamilton, Professor Gilman (then of the Sheffield Scientific School, later president of Johns Hopkins University), President Welch, President Denison, Professor Hilgard, and others.

These manuscripts and documents which the friends of agricultural education have so kindly donated to the committee will be of inestimable value when an opportunity is afforded for compiling a history of agricultural education in the United States.

A. C. TRUE.
E. DAVENPORT.
W. A. HENRY.

The report was received and ordered made a part of the proceedings, and the committee was continued.

The association adjourned to meet at 8 o'clock p. m.

EVENING SESSION, THURSDAY, AUGUST 19, 1909.

Vice-President Kerr called the meeting to order at 8 o'clock p. m.

REPORT OF COMMITTEE ON AFFILIATION.

This report was presented by the chairman of the committee, H. J. Waters, of Kansas:

Your committee appointed to consider the advisability of a closer affiliation between the various societies and organizations seeking to promote the science of agriculture and to report on the relation that the Association of American Agricultural Colleges and Experiment Stations should sustain to such a federated organization begs leave to submit the following report:

(1) It is the opinion of your committee that the interests of agricultural education and research will be more effectively promoted by the more complete correlation of these various societies than exists at present, and that this association may very appropriately lend its encouragement to its accomplishment.

(2) While it is our opinion that this association can not sustain a direct and vital relation to this proposed federated organization, it is recommended that the association give its indorsement to the resolution adopted by the Society for the Promotion of Agricultural Science at its annual meeting, held in Portland, August 17, 1909, which is as follows:

"Recognizing the advantages of closer cooperation in the various lines of scientific agriculture, the Society for the Promotion of Agricultural Science hereby extends a cordial invitation to American Forestry Association, Society of American Foresters, Official Dairy Instruction Association, American Association of Economic Entomologists, Association of Official Agricultural Chemists, Society of Horticultural Science, American Breeders' Association, American Society of Agronomy, the American Society of Agricultural Engineers, Society of Animal Nutrition (and any others that may be in existence), and other similar organizations to unite with it in the formation of an affiliated society which shall include all these organizations which are working for the promotion of scientific agriculture. It is suggested that the affiliation may be formed upon a basis somewhat as follows:

"(1) Each society shall retain its individual organization and shall have entire control of its own business, including election of members and publication of proceedings. If found feasible, however, a common secretary may be employed for the editing and publishing of the several reports.

"(2) There shall be a council composed of one or more representatives from each affiliated society, which may elect an executive committee from among its own members.

"(3) The affiliated societies will hold affiliated meetings on alternate years at the same place, and at nearly the same time as the meeting of the Association of American Agricultural Colleges and Experiment Stations, and for such meetings the council shall prepare a general program in which papers of general interest shall be presented to the joint meetings of the societies, while other papers shall be referred to the affiliated society to which it will be of the greatest interest. On the alternate years, when no joint sessions are held, each of the affiliating societies will hold meetings at such times and places as its own members may decide.

"(4) The council shall publish annually a report of its proceedings and of the proceedings of the general meeting. It may also publish any or all of the papers presented at the general meeting, and any other matter directly related to the promotion of agricultural science which it may deem expedient; provided, however, that this shall not operate to prevent the publication of papers also in the proceedings or journals of the individual societies.

"(5) Each society shall pay to the treasurer of the council annually a pro rata sum for each of its members (not including honorary members), the amount of which shall be fixed annually by the council. Payments from the funds of the affiliated societies shall be made only on the order of the council or of its executive committee.

"In order to carry out this proposed affiliation the secretary of the Society for the Promotion of Agricultural Science is directed to forward a copy of this to each of the societies named and to request the appointment of three delegates from each, if such have not already been appointed, to meet with

the executive committee of this society to consider the desirability of the proposed affiliation, and to arrange a satisfactory plan for its accomplishment. It is requested that these delegates be given power to act for their respective organizations, and it is understood that the outline proposed above may be changed or modified as may be wished by a majority of the delegates present at the proposed meeting.

"It is requested that the delegates meet at the same place and on the day preceding the next meeting of the Association of American Agricultural Colleges and Experiment Stations for the consideration of this matter."

(3) In furtherance of this plan it is recommended that this association invite these allied societies to meet on the day preceding the beginning of the convention of this association.

(4) Concerning the matter of the publication of the scientific work of the experiment station in cooperation with these societies, it is deemed inadvisable to pursue the matter further until it can be definitely ascertained whether or not the plan can be carried out which has already been presented to this association by the committee on experiment station organization policy.

Very respectfully submitted.

(Signed)

H. J. WATERS,
T. F. HUNT,
H. J. WHEELER,
Committee.

The recommendations contained in the report were referred to the executive committee. For further action, see page 45.

WORK OF THE COUNTRY LIFE COMMISSION.

By special request, L. H. Bailey, of New York, addressed the association at this time on the work of the Country Life Commission.

A resolution regarding the work of the Country Life Commission, approved by the college section, was offered by J. A. MacLean, of Idaho, and was referred to the executive committee (see pp. 44, 99).

The convention adjourned to meet at 10 o'clock Friday morning, August 20.

MORNING SESSION, FRIDAY, AUGUST 20, 1909.

The meeting was called to order at 10 a. m. by Vice-President Kerr.

STATUS OF SEPARATE LAND-GRANT COLLEGES.

HOWARD EDWARDS, of Rhode Island. I am not a stickler for terms. I simply want to get at the facts. In preparing the resolution which is before us I had in mind the statement of the status of the separate land-grant colleges more particularly. I think, perhaps, it is not realized that in the East we have a somewhat different situation from that which exists in the West, and as a result of that situation some such statement has come to be what we need quite urgently to-day in order to unify sentiment among ourselves with regard to the separate land-grant colleges. Various expressions have been made with regard to the separate land-grant college which have been used to our disadvantage. Perhaps the expressions were not intended for that purpose. I do not think they were, but they have been used.

There are two points on which strong agitation is being carried on in some quarters. As I stated yesterday, the first point is an effort to make the separate land-grant college practically identical with the agricultural high school. The second is an effort to define mechanic arts, a term that belongs to a past generation, a term which has no very definite meaning for the present generation.

In 1862, when the first Morrill Act was passed, engineering had no very distinct development in this country. Civil engineering was practically all that was known of engineering. Since that time engineering has developed to

include all the industries that pertain to the handling of machinery or the direction of physical forces for the purpose of satisfying human wants. Now, the Morrill Act was intended for the purpose of meeting the needs of two—not one, but two—great classes of our people, and it seemed to me that the time was ripe for the association as such to define its position with regard to the meaning of the term “mechanic arts.” As I said in the beginning, I am not a stickler for terms—for words. Naturally I prefer my own words in expressing my own meaning, but the executive committee, as I understand it, has reworded this matter to suit themselves and it has been submitted to me. I have gone over it quite carefully. I think it covers the three points that I wanted to make, although it is not as detailed and specific as I should desire. I therefore offer as a substitute for the resolution that I put in the following resolution which the executive committee has prepared:

Resolved, That it is the sense of this association that the national laws which constitute the charter of the land-grant colleges distinctly prescribe work of collegiate grade in agriculture and the mechanic arts, including engineering in all its branches, and the sciences related to the industries, irrespective of whether the colleges are established separately or as parts of universities.

Just one more word with regard to the resolution. The movement to consolidate and unify in education is in a general way correct, but I have no apology to make for the existence of the separate land-grant college, concerning which it was stated yesterday by a personal friend of mine, a man whom I esteem very highly indeed, that if the present psychological atmosphere had prevailed from 1862 on it would have been far better if all the schools founded on land-grant funds had been united in one effort by the State for higher education. I am not prepared to take that view, but I want to say that, whatever might have been better, the present situation exists. The land-grant college has done a great work in creating an intellectual atmosphere. It has done it also independently of the university idea, and had it not been for the existence of the separate land-grant college we would not be where we are to-day in respect to this atmosphere. Further than that I desire to say that this function of creating an atmosphere in given sections has not been entirely completed. I know whereof I speak when I say that the separate land-grant college is a vital influence in certain sections in directing, elevating, and clarifying views in regard to industrial education, and we have no right to minimize the importance of the separate land-grant college. I do not have any apology to make for it.

I submit the resolution as an action designed on the part of this association to unify in their aim and purpose all institutions that have to do with industrial education, so far as the land-grant fund is concerned.

WORK OF THE COUNTRY LIFE COMMISSION.

The executive committee reported back to the convention the following resolution presented by J. A. MacLean, of Idaho:

Resolved, That this association express its appreciation of the work of the Country Life Commission in its preliminary analysis of existing rural conditions; and in the belief that the point of view represented by this commission is important and should be more fully developed,

Resolved, That the executive committee of this association be authorized and instructed to memorialize the President and Congress (1) for the general distribution of the report of the Commission on Country Life, (2) for some provision by Congress for digesting and utilizing the great mass of material and information collected by the commission, and (3) for provision by Congress for a broad and systematic inquiry of extended character into the economic, social, and educational conditions that affect rural life.

The resolution was adopted.

[Bull. 228]

REPORT OF COMMITTEE ON AFFILIATION.

W. E. STONE, of Indiana. The question was raised on the recommendation of the committee on affiliation that the association invite these allied societies to meet on Tuesday preceding the main meeting of the convention of this association, which should be called for Wednesday instead of Tuesday as heretofore. The executive committee thought it would be better not to specify the days of meetings of the association or these societies, as called for by this recommendation, preferring rather that the action might be that the association invite these allied societies to meet on the day preceding the beginning of the convention of this association, having in mind, of course, to make preliminary provision for the assembling of these societies.

The recommendation of the executive committee and the report as a whole were adopted.

RECOMMENDATIONS OF THE EXECUTIVE COMMITTEE.

The committee appointed by the chair to consider the recommendations contained in the report of the executive committee reported as follows:

Your committee, to whom were referred the suggestions of the executive committee, begs leave to report as follows:

That the representation of the interests of this body before the Carnegie Board shall rest with the executive committee itself, with the understanding that it may secure any and all assistance necessary to the adequate representation of the varied interests involved.

This recommendation is no reflection upon either the ability or the faithfulness of any individual, but at least four classes of institutions are involved in this matter, viz, the college that is connected with a university, the college that is distinct, the station that is connected with a college, and the station that is distinct.

The composition of the executive committee is usually favorable to the representation of all these interests far more adequately than they could be represented by any individual, with the added prestige that goes with its position as representative of this body.

Your committee further recommends that the executive committee be authorized and instructed to secure the publication in full of the proceedings of this association, omitting only irrelevant discussions and extraneous matter; and that for this purpose the proceedings shall be edited and prepared for publication by the secretary of the association.

In case it is necessary to publish at the expense of the association the bills shall be audited and paid in the usual manner.

Respectfully submitted.

E. DAVENPORT,
A. B. STORMS,
E. A. BRYAN,
Committee.

The report was adopted.

AMENDMENT OF THE CONSTITUTION.

The question of amending the constitution to provide for a section on extension work was taken up. The proposed amendment reported from the last convention of the association was as follows:

At the end of paragraph 1, under the head of "Sections," add the following clause: "A section on extension work composed of directors or superintendents of extension departments in the institutions in this association, or the representatives of such departments duly and specifically accredited to this section."

On a call of the roll of delegates by the secretary 42 voted aye and 9 nay, and the amendment was declared adopted.

The executive committee was authorized to make such verbal changes in the constitution as might be rendered necessary by the adoption of the amendment.

EXTENSION WORK.

K. L. BUTTERFIELD. The committee on extension work wishes to request that the officers who are nominated by the association for the section on extension work be authorized to prepare a program for the section at the next meeting of this association, and the committee in order to bring the matter definitely before the association would recommend, or suggest, perhaps, that the chairman of this section for this year be A. M. Soule, of Georgia, and the secretary, G. I. Christie, of Indiana.

The recommendation was adopted.

W. H. Jordan, of New York, urged more prompt attention on the part of officers of the sections to the preparation of their programs for the next meetings.

RESOLUTIONS OF THANKS.

Resolutions of appreciation and thanks to various agencies that contributed to the success of the Portland meeting, including the Oregon Agricultural College, the Portland Commercial Club, and the citizens of Oregon generally, were adopted.

CONSERVATION OF NATURAL RESOURCES.

The report of the committee on this subject being called for, J. L. Snyder, of Michigan, chairman of the committee, said that there was no formal report to make.

The committee was continued.

ELECTION OF OFFICERS.

The following officers were chosen for the ensuing year: President, W. J. Kerr, of Oregon. Vice-presidents—first, H. J. Waters, of Kansas; second, W. P. Brooks, of Massachusetts; third, C. A. Lory, of Colorado; fourth, P. H. Rolfs, of Florida; fifth, L. Foster, of New Mexico. Secretary and treasurer, J. L. Hills, of Vermont. Bibliographer, A. C. True, of Washington, D. C. Members of the executive committee—from the section on college work and administration, W. O. Thompson, of Ohio; J. L. Snyder, of Michigan; W. E. Stone, of Indiana; from the section on station work, W. H. Jordan, of New York; C. F. Curtiss, of Iowa.

The following nominees for officers of the sections were confirmed: College section—chairman, S. Avery, of Nebraska; secretary, W. D. Gibbs, of New Hampshire; program committee, the chairman and secretary of the section. Station section—chairman, F. B. Linfield, of Montana; secretary, H. L. Russell, of Wisconsin; program committee, the chairman and secretary of the section and W. H. Beal, of Washington, D. C. Section on extension work—chairman, A. M. Soule, of Georgia; secretary, G. I. Christie, of Indiana.

The following appointments on the standing committees were made:

Committee on instruction in agriculture: J. F. Duggar, of Alabama, and W. E. Stone, of Indiana.

Committee on graduate study: W. O. Thompson, of Ohio, and Brown Ayres, of Tennessee.

Committee on extension work: A. M. Soule, of Georgia, and E. A. Burnett, of Nebraska.

Committee on experiment station organization and policy: M. A. Scovell, of Kentucky, and L. G. Carpenter, of Colorado.

The chair explained that Director Thorne had specially requested that he be not reappointed upon the committee on station organization and policy.

REPORT OF COMMITTEE ON STATION ORGANIZATION AND POLICY.

The following report was presented by E. Davenport, chairman:

The committee on station organization and policy has continuously studied the more salient features of station work and in each of its reports has dealt with some one phase of the subject. For three years it has been collecting data as to the methods of dissemination of the results of station investigation. While your committee have other subjects under consideration, this report is confined to recommendations relative to means of publicity.

This report is presented in two sections, one having reference primarily to publications by the stations themselves; the other to a common medium of publishing the results of station research work. The recommendations covering the station publications are made in the interest of uniformity. An extensive study of these publications betrayed a variety in form, serial number, and pagination confusing beyond expression to the would-be student and collector. The new departure in a common medium for publishing the results of station research work is recommended after a painstaking study extending over eighteen months, in which the attempt was made to obtain the ideas and wishes of the members of this association. The outline proposed has been discussed in and indorsed by both the college and station sections of this association.

MEANS OF DISSEMINATING STATION WORK.

In the Hatch and Adams acts provision was made for the acquisition of agricultural information by means of research, also in the Hatch Act for the publication of the results of such research in station bulletins, but in many of the States a large proportion of the farmers either do not receive the bulletins or they are unable to profit by them as they should. In view of this fact every legitimate effort should be made to aid the agricultural press in presenting the station work to the people at large in a popular form. To this end abstracts of bulletins should be furnished to the press, and also illustrative material by way of cuts, charts, etc.

It is recommended that greater attention be given to the organization of departments of cooperative experimentation under such a system that the station shall oversee all of the important features of the work, such, for example, as the inauguration of experiments in the field and the harvesting and weighing of the crops.

It is further recommended that the stations lend their sympathetic support to the organization of demonstration unions, which shall have for their purpose the exploitation by the members of the station work worthy of general application.

On account of the fact that the station investigator has little time for institute work it should be his province to teach the agricultural teacher rather than the public, though it is desirable that he should occasionally attend institutes. That this may be successfully done it is recommended that short normal courses be held at the colleges or independent stations prior to the beginning of the institute season, and that the stations should cooperate in this work by way of setting forth its results and, when desirable, provide illustrative material.

STATION PUBLICATIONS.

The publications of the stations termed "bulletins" should contain solely the results of research, the financial statement, and a general description of the work. They should be paged continuously throughout a given volume, and should be arranged in volumes of convenient size for binding. Each volume should have a table of contents, a title page, complete index, and accompanying directions for binding. The table of contents, title page, and index should be so printed that they can be easily removed and placed in proper position without cutting to single pages.

All publications dealing with inspection work of whatever kind should be published under a series known as "official inspections." These should be numbered consecutively, regardless of the order of sequence of the inspection work; for example: Fertilizers, No. 1; feeds, No. 2; fertilizers, No. 3; human foods, No. 4; and orchards, No. 5.

Such publications may or may not be paged consecutively, since the material is usually only of transient value.

The annual report, if merely embracing the financial statements and a brief summary of the work of the year, should be issued as a "bulletin." If it is of large size and is made a repository of matter of permanent value, it should have its own table of contents, title page, and index.

All other matter published by the stations should be classed as "miscellaneous publications." This may include circulars, notes to the press, etc. Such matter need not be prepared with reference to preservation in indexed volumes. Bulletins of such character as not to be of interest to the general farmer should be numbered and paged consecutively with the others, but should be issued only in limited editions, chiefly to libraries and scientific workers. Popular abstracts of all such bulletins should be prepared, showing the pages represented by the complete bulletin, thus indicating to all who wish to bind them that a complete copy should be secured to take the place of the one in abstract.

All bulletins and reports should have the number and date of the publication at the top of the left-hand page and a running title at the top of the page at the right.

The name of the station, the number of the bulletin, and the title should appear conspicuously and, uniformly for a given station, in the same place on the title page.

All bulletins should be electrotyped, if possible, in order that later demands for them may be satisfied.

Each station should set apart a sufficient reserve of each bulletin to meet demands for several years from important libraries and from kindred institutions, to the end that such institutions may be able to make their bound sets complete.

Each bulletin and each article in reports should, when practical, contain a brief, concise summary.

The stations should adopt the same abbreviations in referring to other publications as are used in the Experiment Station Record.

RESEARCH JOURNAL FOR EXPERIMENT STATIONS.

A journal of agricultural research with uniform size of page to contain detailed original reports of scientific investigation made by the agricultural experiment stations.

This journal to be published by the United States Department of Agriculture under the terms of a cooperative arrangement between the Secretary of Agriculture and the Association of American Agricultural Colleges and Experiment Stations.

The use of this journal will not preclude the publication of the same material by the individual station.

The journal to be prepared under the general management of an editorial board appointed jointly by the Association of American Agricultural Colleges and Experiment Stations and the Secretary of Agriculture.

The Director of the Office of Experiment Stations to be ex officio secretary of the board.

Editorial office to be in the Office of Experiment Stations.

Cost of publication to be defrayed by Congress.

Free distribution to be restricted to lists to be prepared under the supervision of the editorial board.

Price lists to be regularly sent to lists of individuals and institutions at home and abroad prepared under the supervision of editorial board.

The Department of Agriculture to be in no wise held responsible for articles published in this journal.

The executive committee of the association are, by the adoption of this report, instructed to confer with the Honorable Secretary of Agriculture, and to take such steps and use such means as shall in their judgment lead to the establishment of a medium of publication for station research on the general principles herein outlined.

E. DAVENPORT.
H. J. WHEELER.
CHAS. D. WOODS.
CHAS. E. THORNE.

The report was adopted.

[Bul. 228]

ANNUAL DUES.

It was voted that the assessment for the coming year be \$15 for each college and station represented in the association, but that in the event it became necessary for the association to meet the expense of printing the proceedings of the association then the assessment should be \$25 for each college and station.

FUNDS FOR THE GRADUATE SCHOOL.

E. DAVENPORT. While we are considering financial affairs it may be proper to say a word about our graduate school fund. The auditing committee in looking over the treasurer's books was reminded of the fact that only 22 institutions have subscribed to the graduate fund. This is a serious situation. I speak of it from the standpoint of a member of the committee on graduate study and of one who has had something to do with the expenses of these schools in the past.

We have had some difficulty so far in finding institutions willing to entertain this graduate school, and I am sure others will agree with me in saying that this entertainment is no small burden upon an institution. It goes without saying that the supply of institutions willing to invite the school which the association has adopted or developed and which it only partially supports in money is going to be uncertain. Legal difficulties are cited, but in general either 22 colleges are acting illegally or 22 other institutions are too much scared about the law. This matter of \$25 per institution per year for this purpose is a simple matter. I can not see where it would be illegal in any case. I can not believe that out of our 50 colleges and institutions in this country only 22 can help to support this school.

A. C. TRUE. I heartily agree with what Dean Davenport has said, and in that connection it must be kept in mind that the money contribution of the holding institution is only a small part of its actual contribution, because the institution gives the use of its buildings, laboratories, equipment, and the services of a considerable number of its faculty to the graduate school, so in the total it is a very large contribution that the holding institution has to supply. It seems to me that the other institutions represented in the association should show their sense of gratitude toward the holding institutions by a general cooperation in the work of the school. I can hardly believe, whatever the legal status may be, that any institution represented in this association can not secure \$25 a year from some source which may be devoted to the purpose of graduate schools. It only needs a little attention on the part of the managers of these institutions to secure more general cooperation in the work of the schools.

It is also very desirable that some arrangement should be made within each agricultural college by which members of the faculty and station workers may have opportunity to attend this graduate school. The membership has steadily risen, but so far it has not reached the point it ought to, provided there was general participation in the school by all the institutions.

I recognize the fact that the labors of the faculties of these institutions are constantly increasing and particularly that the establishment of summer sessions has made it difficult for men to attend the graduate school. But I feel sure that if all the institutions have clearly in mind the advantages of the graduate school they can arrange so that some members of their faculties in every case will be able to attend its sessions.

The association then adjourned sine die.

MINUTES OF THE SECTIONS.

SECTION ON COLLEGE WORK AND ADMINISTRATION.

AFTERNOON SESSION, WEDNESDAY, AUGUST 18, 1909.

The meeting was called to order at 2 o'clock p. m., by W. J. Kerr, of Oregon, secretary.

In the absence of the chairman, J. C. Hardy, of Mississippi, was chosen to preside.

The following paper was read by A. B. Storms, of Iowa :

THE DISTINCTIVE WORK OF THE LAND-GRANT COLLEGES: THEIR FUNCTION, SCOPE, AND ORGANIZATION.

The "land-grant college" has now been in existence long enough to make the inquiry as to what definition it has wrought out for itself both pertinent and interesting.

It was obviously the intention of Congress, which out of its wealth in lands appropriated endowment for the purposes expressed in the Morrill Act, that institutions of learning should be organized entirely distinct from existing state universities. It was an after thought in several States that this endowment might be turned over to the state universities on condition that the universities should incorporate into their curricula the subjects required in the Morrill Act.

The argument for thus centralizing the educational resources of any State in one institution is familiar. This argument was used effectively by President Andrew D. White in the case of Cornell University. And this policy of centralization has been followed in a number of other States than New York, though I believe in New York an institution separate from Cornell has now been authorized. Wisconsin, Illinois, Nebraska, and Minnesota are notable instances of this centralizing policy.

The reasons for consolidation may be summarized briefly as economic and pedagogical.

It would appear to be more economical to administer the interests of a college of agriculture and mechanic arts as part of a greater university than as a separate institution. Pedagogically the idea has been a fascinating one that a university should be a place of learning where anybody could get anything. As nearly as possible it has been felt that a university should, as its name implies, be hospitable to all learning. In America particularly there has been a very eager ambition for bigness, and it has been considered that resources, scope and variety of work, and numerical enrollment of students were tests of greatness.

In all candor, has not the time come for frank and critical inquiry into the validity of some of these current ideas?

It has so long gone almost without challenge that those States were somehow actuated by a narrow and shortsighted policy that organized their colleges of agriculture and mechanic arts separately from state universities that it may seem startling and revolutionary to suggest the possibility that such separate organization is first of all in the spirit and intent of the original land-grant act, and, second, that such separate organization is pedagogically the wiser policy.

These are suggestions, however, which I wish to make at this time.

Our "Magna Charta" reads in part, "and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

In Iowa, which may be taken as typical, the general assembly, September 11, 1862, accepted the grant upon the conditions and under the restrictions contained in the act of Congress, and by so doing entered into contract with the General Government to erect and keep in repair all buildings necessary for the use of the college. By this act of the general assembly the college was changed from an agricultural institution into a college of agriculture and mechanical arts, with the broad and liberal course of study outlined in the following paragraph.

In 1882 the general assembly passed an act defining the course of study to be pursued as follows:

"SECTION 1. That section 1621 of the Code is hereby repealed and the following is enacted in lieu thereof: 'Section 1621. There shall be adopted and taught in the State Agricultural College a broad, liberal and practical course of study, in which the leading branches of learning shall relate to agriculture and the mechanic arts, and which shall also embrace such other branches of learning as will most practically and liberally educate the agricultural and industrial classes in the several pursuits and professions of life including military tactics.'"

Universities were more eager to enjoy the benefits of the endowment than to carry out its purpose, though it should in justice be said that now some university authorities are earnestly seeking the development of this phase of their work and with commendable success.

At first, however, the presence of older and more definitely established courses of study and professional schools overshadowed the newer interests. Especially has this been true in agricultural science. Schools of agriculture have been organized in connection with universities that were purely secondary in grade, or the courses in agriculture have been established with practically no entrance requirements, or with low entrance requirements. In some States the energies of the faculties in agriculture have been devoted to short courses of a few weeks or a few months rather than to thoroughly collegiate courses leading to degrees and based on a thorough study of the natural sciences.

On the whole it seems to have been easier to develop courses of scientific character and collegiate grade and to command student enrollment in considerable numbers for such courses where the institutions have been organized separately from State universities. Cornell is a notable exception, and in Minnesota, Nebraska, and Wisconsin there are courses of collegiate grade enlisting increasing numbers of students. However, the university colleges of agriculture have followed somewhat tardily in this development.

There is a pedagogical reason for separate organization—perhaps it should be called an administrative reason—which has received but little, if any, adequate consideration. The rapid evolution of courses of study in the fields of applied science has resulted in a variety and extent of work sufficient for any one administrative head or governing body. A well-equipped college of agriculture and mechanic arts to-day will offer five or six hundred distinct courses of study, will have a hundred laboratories, and faculties numbering one hundred and fifty or two hundred. It will have resources equivalent to an endowment of fifteen or twenty millions of dollars and will be organized into twenty or thirty distinct departments. Its student enrollment will be from fifteen hundred to two thousand or more. This is vastly more in variety and interest than any university included but a few years ago, and is enough for one institution.

The department-store idea is going out of date. The great historic institutions of learning, prototypes of the modern university and the modern college, grew up around a central and single idea. The University of Athens sprung from the philosophical impulse of Socrates, Plato, Aristotle. The University of Alexandria grew up around a library and the passion for manuscript.

The University of Bologna was a school of law, the University at Salerno was a school of medicine, the University of Paris, prototype of modern universities,

sprang from the philosophical impulse of Abelard and was essentially a school of philosophy in the period of conflict between nominalism and realism. Indeed, as President Schurman of Cornell has frankly said, "The notion that a university is a school in which all the faculties or branches of knowledge are represented has no warrant in history."

The astonishing complexity and variety and diversity of work now done in institutions of higher learning leads to many perplexing administrative problems.

Is there not in the fundamental idea of the land-grant college—namely emphasis upon science as related to the industries—a unifying and coordinating influence that makes for sympathy and cooperation hard to secure among colleges that lack such coherence? The American university is in danger of becoming unwieldy.

It seems logical therefore to consider that the typical land-grant college is the separately organized college rather than those organized with universities.

At first these institutions, though inspired with a great and fruitful idea and with a desire to make higher and scientific and technical education democratic and to bring its privileges near to all the people, had, nevertheless, to feel their way toward a definition of their purpose and to work out suitable courses of study. This task becomes one of deepest interest and fraught with not a few difficulties because the whole field of applied science is new. In agriculture particularly a knowledge of scientific principles and their application to the problems of animal husbandry and of the soil, of dairying and of horticulture, was quite imperfect, but has rapidly increased in definiteness, scientific accuracy, and industrial importance. The progress of the last forty years, whether measured by bulk or quality, is probably more significant and more important than that of all the preceding centuries.

The task of defining the field of science and applied science in college courses also presented educational problems of the gravest importance. If, in accordance with the national and state law, the youth who were to attend these institutions were to be broadly and liberally educated, and at the same time to be technically trained in science as related to the industries, a double purpose of most critical importance must be kept in view—the broad and liberal education of young men and young women and at the same time their scientific and technical training. The land-grant colleges have, in recent years, been in close conference one with another, their presidents and representatives meeting in annual association, each profiting by the experience of the rest in an endeavor to develop courses of study, to establish standards, and to determine the requirements for scientific and technical degrees. It is obvious that there must be a compromise between the old classical ideal of a college course in which "nothing useful is taught" and the equally extreme and inadequate notion that such an institution should be a trades-school. A trades-school does not broadly and liberally educate, neither can it be scientific in its methods. In the nature of the case the framers of the original organic law, of the Morrill Act, and of the state acts, did not, themselves, have a completely elaborated and perfected system of education clearly in mind, but rather a great and fruitful idea which must be left to the college authorities for elaboration and perfection. The development, however, should be in fundamental and sincere harmony with the purposes of the law, and hence the law itself has become the guiding principle and regulating ideal.

While under the law it would be entirely consistent for a land-grant college to offer classical courses leading to the degree of bachelor of arts, and while in some States this is done, in others classical courses, as such, are not offered nor the degree bachelor of arts given. The emphasis is upon science studies and upon the branches of applied science which particularly affect agriculture and mechanic arts. As in all well-established and accredited institutions assuming to give broad and liberal education, certain general studies are considered essential, such as English, including principles of speech and expression, and a sufficient study of English literature to give the student a somewhat adequate standard of individual taste and judgment; brief but comprehensive courses in history that shall familiarize the technical student with the origin and development of the industrial, social, and political institutions, and to fit him for intelligent citizenship in a free country. Some study of modern languages is universally recognized as an important element in all technical institutions of collegiate grade. This is particularly true in those branches or groups of studies in applied science which lead the student to the literature of science in other tongues than our own, and for the technical student to make him familiar with the

language of peoples with whom he is likely to deal in professional and scientific work in after life.

It is obvious that the original act as worded embodies a compromise. The phrase "without excluding other scientific and classical studies" expresses a conservative feeling. It treasures a protest against putting so much emphasis upon "such branches of learning as are related to agriculture and the mechanic arts" as to exclude the humanities and other scientific studies than those immediately related to the industries.

The most characteristic tendency of the land-grant college is not toward greater and greater breadth—an itch to become a university—but toward organic evolution. Its greatest danger is not that of spreading over all creation but rather of becoming too intensely special. Technical studies in the hands of specialists are likely to win in competition with more general subjects for favorable places in the curriculum.

The land-grant college, by its inception and development is essentially an institute of technology. Science is basal in all its work, but its major interest is "science as related to the industries." The two great fields of industry specially mentioned are agriculture and mechanic arts or engineering. Closely and logically affiliated with these two great branches of applied science are domestic technology and veterinary science.

It was evidently the intent that these institutions should be coeducational. We of the Middle West are so thoroughly committed to the coeducational policy that this question seems scarcely debatable. Suffice it to say that there are many young women who desire and who should have the opportunity for technical courses such as the land-grant college is peculiarly fitted to give. The college, moreover, needs the presence and the influence of the women quite as much as the women need the college. Those best acquainted with the wholesome social atmosphere of coeducational institutions, where social life is incidental and rightly regulated, will be least likely to question these statements.

Domestic technology courses should be of collegiate grade and thoroughly scientific in character, and are best developed and given in the atmosphere of a college where the major interest is upon technical phases of scientific study.

Occasionally there are women who desire technical studies or courses in engineering or in agriculture. There will, I believe, be increasing numbers of women taking part or whole courses in agriculture, especially courses in horticulture and in general agronomy subjects.

Where the local state conditions warrant it, a department of veterinary science not only may appropriately but should be established.

Animal husbandry interests are of increasing importance in many States, even in some where there has been but limited interest of this sort heretofore. There is a noticeable extension of highly bred and valuable live stock among farmers. The superior value of pure-bred stock for the average farmer has become well-nigh universally accepted. And with this extension of live-stock interests the demand for the scientific veterinarian is increasing. The day of the "horse doctor" is rapidly passing.

Moreover, as we well know, the demands for scientifically educated veterinarians to meet the requirements of government service in the army and in the general administration of the federal laws governing interstate commerce in meats and other animal food products is greater than existing institutions can meet.

Municipalities, too, are rapidly assuming responsible regulation of milk and meat supplies in the retail trade within their jurisdiction, and for proper execution of ordinances covering these matters as well as in the drafting of the proper ordinances, veterinarians who have had advantage of thoroughly up-to-date education in the scientific aspects of veterinary practice are in demand.

The land-grant college is the proper and economical place for the location of departments of veterinary medicine. The necessary science studies will, as a matter of course, be available, chemistry, zoology, bacteriology, and histology being specially important. Certain work in animal husbandry will be there best available. For while the studies of the veterinarian will be largely of pathological and anatomical conditions, he should have considerable instruction in regard to animal nutrition and breeding and the general principles of the care of live stock. A very valuable coordination of courses between departments is, therefore, easily possible between veterinary and animal husbandry and science departments.

ORGANIZATION.

In the organization of departments local conditions as well as logical segregation of courses of instruction must have consideration.

In general, it is my conviction that it is best to hold together under the headship of a single department all the work of an institution that can logically be classed under one scientific subject; for example, there is increasing interest and importance attaching to bacteriology. Scientific students in dairying, in animal husbandry, in agronomy particularly in soil studies, in veterinary science, in domestic technology, and even in civil engineering when studying the strength and character and durability of materials under varying conditions, must give attention to bacteriology. Now, it is of course possible that a special bacteriologist should be added to the dairy department, another to the veterinary department, and so on with no coherence or unity between these various lines of bacteriological work.

Such an organization often appeals to the heads of technical departments. They can thus have the instruction given under their own independent control and can make sure that the special application of the subject which they desire for their own students is made in a satisfactory manner.

This desire for department independence may, however, lead too far, and I believe does when the engineering faculty has its own engineering instructors in modern languages, as at the University of Michigan, and their own instructors in English, etc.

It is not at all unusual that a professor at the head of a technical department is not himself really prepared to direct critically the work of a scientific specialist, as a bacteriologist or chemist, even in the particular field of his own specialty. A professor of soils having charge of experimental work in that field said to me recently, "I am not qualified to do or to direct closely the work of a soils chemist. I want," he added, "a specialist in organic chemistry who is capable of initiative and independent work beyond my ability to direct him."

This general statement and inquiry concerning the proper relation of science and technical instruction leads to a broader question of policy.

On the one hand is the radical scientist who looks with some disdain, not altogether unwarranted, upon the tendency to premature applications of science to some technical subject. Thus to take a class of freshmen who have never studied chemistry and enroll them in classes in "agricultural chemistry" appears to him absurd, and he is fully half right. Chemistry in the elementary phases of the science is elementary chemistry, and can not appropriately have "agricultural" or any other technical adjective attached to it. To undertake to make an agricultural chemist or to introduce to agricultural chemistry a student who has not yet learned the elements of chemistry comes dangerously near to scientific quackery. The best that can be done to give a particular bias or flavor to the subject at first is to select simple problems from the field of special or anticipated interest, just as problems in elementary arithmetic may be taken from the field or from the shop, according to the major interest of teacher or pupil.

The demand which the technical departments make upon the teachers of science is not, however, entirely without justification. The horticulturist very naturally wishes his students of horticulture to be taught botany, with special reference to horticultural interests. He wants his students to be familiar with horticultural nomenclature and feels that the illustrative material for horticultural students while they are studying botany should be taken as far as practicable, from the field of horticulture. He can not see why botany may not and should not be taught in a way to awaken initial interest in horticulture. The departments of science should recognize this practical demand of the technical departments and be sympathetic toward them.

Yet I believe the best interests of the college as a whole, and this means, of course, ultimately the best interests of the students, are conserved by keeping at the head of the science teaching teachers of science. Zoology should be taught by a zoologist, and botany by a botanist, bacteriology by a bacteriologist and chemistry by a chemist. All these should be broad enough to appreciate the element of legitimacy there is in the demands of technical teachers and students, but should command for science itself, irrespective of its particular applications, the respect which is its due. Premature specialization or an abortive attempt at premature specialization is narrowing and puts the student in a wrong attitude—an unscientific attitude toward the very subjects which should

be handled by him in a fearless and thorough loyalty to the method and spirit of science. He should first of all for real scholarship be trained to the scientific method or habit, leaving for the first subordinate the possible or actual applications of the knowledge of principles to any particular field of industry or technology.

An objection which may at times be serious will probably occur to any who have faced these administrative problems under a sense of personal responsibility for policies to be adopted. This arrangement of centralizing under the headship of a science department all the branches of that particular science as it ramifies into the several technical departments will apparently give to the technical instructor of any science subject, as dairy bacteriologist, two directors, the head of the science department and the head of the technical department. It is a proverb well worth heeding in all administrative policies that no man can serve two masters, etc.

It is my opinion, however, that two safeguards well attended to may prevent trouble where those seeking trouble might easily find it. First, men should be selected who are not prone to hunt for trouble, but who possess the happy faculty of adapting themselves to their colleagues and to conditions without friction. This caution should apply to the selection of the head of the science department particularly and to the instructor who is to serve two masters. Second, the respective functions of the head of the science department or scientific critic and supervisor and those of the head of the technical department should, as far as practicable, be defined and understood. The head of the department of soils may, for example, with excellent propriety be quite modest in passing judgment upon the purely scientific aspects of the work of the instructor in soil bacteriology who is instructing soils students in bacteriology, but his opinions should have weight in determining how much time in any group course of study bacteriology should have and in determining what aspects of soil bacteriology should have emphasis. It may be very important that the student should have his attention especially devoted to the influence of bacteria on soil fertility and plant growth, and the soils man is the one to be heard in this matter.

The importance of keeping the college closely correlated in its departments and courses, maintaining organic unity, is so vital as to make it well worth while to guard against the tendency to quasi independence of departments and department provincialism.

Concerning the board of management and control of the state college, there are probably as many opinions as there are methods in vogue.

In Iowa the common board for all state educational institutions has prevailed. Excellent men have been nominated by the governor and confirmed by the senate. Curiously enough, the personal convictions of some, if not the majority, of the men selected for this common educational board were opposed to the policy. But they have entered upon their duties in good faith. It remains to be seen whether the interests of three state institutions are not too varied and important for any one board of trustees, and whether a centralized board, the members of which are to be nominated to the senate by the governor, can so far be kept out of partisan politics as to preserve the state educational institutions from baneful influences.

Suffice it to say that in so far as the president of the college finds his hands tied in selecting and recommending faculty and instruction force, or in so far as academic or administrative freedom is interfered with by political influence, dry rot is certain to result and corresponding inefficiency and demoralization. From all these evils may Heaven fend us!

The standard requirements for college admission are none too high. Four years of accredited high-school work or its equivalent is little enough preliminary training for any student entering upon a scientific or technical course. A low standard means low grade college work. It bids students away from the high schools, where they ought to finish their secondary education. It prevents well-prepared students from entering. They will go where the requirements are higher and there are corresponding dignity and character in the work done. Let there be all the short courses, secondary school technical courses, and extension schools and courses that can consistently be organized and carried forward, but the main business of the state college of agriculture and mechanic arts is scientific direction, leadership, and efficiency. These we must have or the rest will soon run into the shallows. Streams are not in the habit of rising much above their sources, and until the law of physics

and of pedagogy is abrogated we do well to heed its meaning and not allow a base competition for numbers of students or any specious department of the "city high school," or any sympathy for the overgrown boy who, through misfortune, stupidity, or neglect, lost his opportunities for preliminary education to lead us to the vain effort to maintain scientific leadership or to do worthy work with only a short cut from the eighth grade to the freshman class.

The talk, of which we occasionally hear something, that these land-grant colleges of agriculture and mechanic arts ought, perhaps, to be unique and to disregard the standards established by long experience for classical and liberal arts schools, is nine-tenths nonsense and the other tenth moonshine. There is no educational work that requires severer scientific discipline than courses in science as applied to the industries. If the professional schools of law, medicine, and even dentistry find it highly expedient to require one or more years of a college course in addition to high-school courses for admission, the state college can in decent self-respect require no less than four years of secondary education for admission to its freshman classes.

Graduate studies in technical lines can not best be developed and carried forward on the basis of stray undergraduate work in these subjects. There is a good deal of loose current talk about colleges and universities that is wide of the mark in America. The American university, and especially the state university, is *sui generis*. It has grown up out of the democratic conditions of America and is, perhaps, the most typically democratic development of higher education on a large scale to be found anywhere in the world. But the term "university" refers more especially to its variety of departments and lines of work, especially its professional schools, than to its grade of work. Until recently, in the professional schools of our state universities a low standard has been maintained, particularly in entrance requirements. Graduate courses have been added in most state universities, but only so far as a sort of adjunct rather than as a main division of university work. Whether it is the province of the state university, as such, to become primarily a graduate school, I leave to others to consider. It is my conviction that graduate courses should rest upon the strongest undergraduate work. In pure science this might be in the university. Perhaps an organic chemist could best be trained there. But graduate work in technical subjects, particularly in the field of agricultural science, should be developed at the college of agriculture where the undergraduate work is strong. The place for a graduate student in any special line, as in soils or animal husbandry, is where the atmosphere and the soil are ready for this advanced work in the undergraduate studies and in the departments where these subjects are already handled thoroughly in the elementary college courses.

E. A. BRYAN, of Washington. I can but commend the general spirit and tone and thought of the entire paper. No problem, perhaps, is of more importance to the land-grant colleges than the determination of the function and scope and organization of those institutions. It was, indeed, a fortunate thing, that in the original Morrill Act so much was in outline and so much of the detail was left to be determined afterwards. An attempt, at that period of educational history, to determine matters of detail would have been misleading, and, perhaps, injurious. It is, perhaps, equally fortunate that in several of the States of the Union, in accepting the provisions of the various national acts, there has been a considerable latitude in the system of organization, and in the definition of the function and scope of agricultural colleges and universities. Though all this was a new thing in the educational history of the world (and had to be wrought out by men in whom educational traditions were fixed, whose philosophy of education was established, whose experience in technical education or lack of experience might have led to diverse results) it is a matter for congratulation that in so many States of the Union and under such diverse conditions, we have such uniformity and almost unanimity of development; so that were we to examine the curricula of those several institutions to-day, or were we to examine the practice of the several institutions, we would find the uniformity very marked.

It was suggested by the speaker that perhaps the separate and distinct college of agriculture and mechanic arts was more typical of the ideal of the

nation and of the legislature in the establishment of these institutions, than are the universities which belong to the system. It does not seem to me a matter of much consequence that this question should be settled or even largely discussed, for, as a matter of fact, we face a condition to-day, and not a theory. As a matter of fact, we have some 18 or 20 States in which the universities are the land-grant colleges of the States, and it is not likely that in any case a change will be made, the institution be divided, and a separate and distinct college of agriculture and mechanic arts established. It is more likely that in some cases there shall be a tendency toward concentration. In the history of the development of the matter for a long time the universities absorbed the funds intended for industrial education, and devoted them to other purposes, usually to the support of the same old system. It was so deeply fixed in the minds of those in charge that real education after all is literary education, that the real means of education is a verbal means—the use of words, of language, of literature—rather than of science and the arts, that the old system prevailed over the new. In so far as science was admitted, it was to be used in a very abstract and not in a concrete way. In many instances the universities diverted these funds, believing that in so doing they were rendering God service. But I am here to say that practically all of them have seen the new light, and I am free to say, so far as my judgment is worth anything, that some of the very best examples which we have to-day of the true spirit and thought of the land-grant colleges we find exhibited in some of our universities. I believe that if I were to pick out to-day the institution which I would regard as the best exponent of the thought of the land-grant colleges, I should pick it not from the class that I represent, the separate institutions, but from the land-grant universities of America. Perhaps this has been due not to the presence in any greater degree of the spirit there, but to the earlier presence of more adequate funds.

When we use this phrase, "land-grant colleges," we are of course aware of the fact that we are using a phrase which is by no means characteristic of the institution; rather a historical phrase, a name which points to the history of the institution in order to get at the unity of these institutions as we see them.

And this calls to mind the fact that we have in this country a group of institutions which are national or seminational in character. This group consists of some 20 or 25 colleges and some 20 state universities, tied together by this national legislation, by the fact that they are to a certain extent under national control, that they are beneficiaries of the national fund, and that they represent a truly national spirit. And I would like to see cultivated to the very greatest possible extent a solidarity of interest among these institutions. There has existed and does exist to-day a solidarity of interest which is going to continue. We have behind us the precedents of forty-seven years since the first Morrill Act was passed. I am sorry to say that this organization is not, in my judgment, to-day quite as representative of this solidarity of interest and this unity of purpose as it was eight or ten years ago. Nevertheless, I believe this solidarity is one of the things which both the universities and the separate colleges of agriculture and mechanic arts should cultivate by all means in their power. I believe this will work to the greatest pedagogical advantage and to the greatest advantage in the development of the great educational idea which they represent, and certainly to the greatest advantage in the matter of organization and in retaining and securing of additional money for this great end. We are bound together not only by the fact that we are national, but also by the fact that we represent what seems to me to be the greatest ideal in education of the last half century

at least; an ideal in which the larger part of the community is served, in which the condition of the larger part of the community is bettered, and in which higher education has, at first slowly and afterwards more rapidly, come to face in a new direction.

I have already said that under the old idea it was believed that the only education was literary education, that the only means of education were the verbal means, the only proper attainments were books, and if science was admitted at all it was admitted purely for the sake of abstract truth. In many cases there seemed to be even an avoidance of the application of science to the practical concerns of life. But there has been a revolution in the last half century in this respect, and the way has been led by the colleges of agriculture and mechanic arts. It is a notable fact, it seems to me, that the influence of this ideal within those universities which are the colleges of agriculture and mechanic arts of the several States has revolutionized in many instances the whole spirit of the institution, so that not one part but the whole institution faces in a new direction. Some of these institutions have developed out of those separate institutions established for the one purpose of agriculture and the mechanic arts. For example, the University of Illinois, formerly the Illinois Industrial University, was, at the outset, an exponent of the new system, only a child of the Morrill Act, and it developed into what is known as the University of Illinois, and particularly in recent years it has had a most marvelous development, as we all know. Maine and Kentucky are similar illustrations. With the establishment of the newer universities, also, even from the very foundation, the new idea was dominating. For example, I think I am not misrepresenting my friend from Nevada here when I say that he is an observer of the fact that the new spirit or idea in education has dominated his institution from the beginning. And in this ideal we have recognized not merely the establishment of schools to train farmers, or to train mechanics; we have recognized the fact that these institutions are after all and primarily educational institutions; that they exist not to make the farmer, not to make the mechanic, but to educate the man; and in the lessons which we learned during our earlier years many of the abortive attempts of our institutions, and particularly of the separate ones, was due to the fact that they had placed before themselves a very narrow function—that of making farmers; that they must make farmers at all hazards, and that it was necessary to keep that function in view as its chief end; that we must not educate him too much or else he will not farm. But we have come to realize that this later development will take care of itself; that our principal function should be to educate the man, and we can do that with no narrow curriculum, but only by laying the basis in a broad and liberal education, one which begins in the earlier years and solidly provides, as suggested, the requirements for admission to the institutions, and this in a curriculum sufficiently broad. We must develop the man and we can well leave the matter of the vocation to take care of itself.

So far as the scope of the colleges of agriculture and mechanic arts is concerned, every one who has given any attention to the science of education at all knows that education, to be education, must cover a sufficiently broad field. I believe that in many instances we have not only confined the curriculum too narrowly to agriculture and the mechanic arts, but that even in the teaching of these subjects we have too narrow a conception. For example, and by way of illustration, I believe to-day that in the matter of agricultural production we are much further ahead than in that very important field of agriculture, the economical disposal of the fruits of agriculture. We know decidedly more to-day about the soil, about tillage, about the production of

crops or live stock, than we do about what to do with these products when we have got them. The proper management, the proper disposal, the whole economic arrangement of society for the care and distribution of the products after we have them, have been very largely neglected. A few years ago, when during a wave of Populism, a western agricultural college appointed three or four professors in political economy or economics, many of us laughed; but, while, perhaps, we might have criticized the detail, the idea underlying was correct. In these economic questions which are so intimately connected with the agricultural development of the country, we are far behindhand. We are not doing enough in the study of the problem of transportation, and we are not doing half enough in the matter of state taxation; we are not doing enough in the study of a whole list of economic problems which are just as closely connected with our work as are questions of production, and I believe that the colleges of agriculture and mechanic arts are in greater danger if they undertake to abridge the scope of study than they are from its enlargement.

It was suggested by the reader of the paper that some history, and particularly that which is connected with the industrial history of the race, should be studied by these several technical departments. I quite agree with him. I would go further than that. I have had in the past some opportunity to study the subject of the history of agriculture, and realize how large a field there is which has to be explored by the original explorer, even before it is taught in the class room. But while I should regard the study of industrial history and the industrial classes as important, nevertheless, I would say also that no college man in any kind of college, technical or otherwise, ought to go forth without a very general knowledge of the history of the world outside of this industrial history. We must make him a broad and liberal-minded man. Held within the narrow lines of a single science or a small group of sciences, he can not have such an education as he should have.

As a question of organization I quite agree with the suggestion of President Storms. A departmental system, it seems to me, is particularly well adapted to institutions of the character which we represent. And as to the details of departmental organization which he has suggested, I would give to them my very hearty indorsement and approval. I believe it has been, and is almost from the nature of the case, the universal experience of the colleges of agriculture and mechanic arts that there should be an opportunity for departmental election. In contrast with the Harvard system of free election, the agricultural colleges have followed in general a system of departmental election. Even within the realm of agriculture itself we are more and more tending toward an election and selection of one or the other subdivisions, as horticulture and agriculture proper, or as agronomy and animal husbandry. And in the engineering courses the same thing is done, narrowing, of course, the limits of the field for free election very greatly. This, we may say, is an almost necessary consequence of the idea lying at the basis of the institutions of this class.

One other point I should like to mention, and that is this: There has been, I think, in the universities which are the land-grant colleges—though perhaps they have not been fully conscious of it—too much of a tendency to regard the one single department of agriculture as being the entire fulfillment of the national and state legislation relating to this subject, and to make this separate department comparable to the separate institutions. If they were to confine for a moment the education of their agricultural students to the curriculum offered by this one department, they would see how erroneous such a view is, and that in no respect whatever is the single department of agriculture com-

parable in its organization or method, or in the details, to the institutions upon which falls the duty of fulfilling entirely within the State the function of the college of agriculture and mechanic arts. A large portion of the work in the university of the college of agriculture or the department of agriculture, as the case may be, may be done and will be done by other departments of the institution. In the department of English, general English will be studied; in the department of chemistry, at least elementary chemistry will be studied, and all of it should be. But, as has well been said, the primary sciences, chemistry, botany, zoology, etc., will touch practically every part and portion of industrial education, and strong, independent departments in these should be maintained. And so within the university, those parts of it which do not regard themselves as part of the college of agriculture and mechanic arts will, nevertheless, contribute to the education of the men in that department, and will discharge a function which in the distinctly agricultural college must be provided for by the establishment of like departments. On the other hand, language and history and economics and other subjects characteristic of the liberal arts courses must also find their place in the college whose chief function is technical and industrial education.

HOWARD EDWARDS. In what I shall have to say, I desire to direct attention to a matter that is coming more and more into the public mind through the attitude of the Carnegie Foundation—the matter, namely, of the scope and work of the land-grant college when separate and distinct from the state university. Were it possible to fix the scope of this work without reference to the law, the problem would be different. As it is, however, due regard must be had to the law, and the public in each State must be informed as to the requirements of that law. Let us for a moment, then, examine the body of laws that originated and shaped these schools.

It is not always recognized, except by students of the matter, that the law of 1862 with regard to the land-grant colleges differs materially from the law of 1890 on the same subject, and that both these laws apply to the separate land-grant college just as rigidly as they do to the land-grant university. Moreover, the State accepting the benefits of these laws can not contravene their provisions by requirements of its own. Between these two laws twenty-eight years intervene, and twenty-eight years do not pass without affecting men's ideas quite materially. The forces and purposes behind the law of 1890, while not antagonistic to those behind that of 1862, are not fully the same and the differences are apparent in the provisions of the laws themselves.

(1) The law of 1862 is quite vague in the expression of purpose. The law of 1890, on the other hand, specifically enumerates the subjects that shall be included under its provisions.

(2) The law of 1862 prescribes as the leading object "to teach such branches of learning as are related to agriculture and the mechanic arts." Now, I submit that to teach subjects related to agriculture and to teach agriculture, as is required in the law of 1890, are two clearly distinct things.

(3) In the law of 1862 is found an additional explanatory phrase—"in such manner as the legislature may prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." After the positive, though general, definition of the leading purpose as given in (2), note how the limitations vanish and the horizon widens with a suddenness and completeness quite bewildering. It is as if the author, after proposing a thoroughly new and untried purpose for a college, grows frightened at his own temerity and takes refuge in stock phrases vague in meaning and familiar of sound. With this most interesting bit of psychology,

almost unique in modern law-making, there is nothing comparable in the 1890 law, which is absolutely certain of its purpose and as inexorable as fate in its expression.

(4) The previous three differences are specific. The fourth, however, is more general and inferential in its nature. The law of 1862 neither lets go of the old formal education nor firmly grasps the new. It does, indeed, recognize the dignity of the active as distinguished from the contemplative professions, and the value of a trained intellect directed upon lines of common activity in life. Senator Morrill was himself not a college-bred man, and it was his private study of traditional subjects done in active connection with mercantile pursuits that gave him in his educational views that curious combination of respect for traditionalism and interest in preparation for active life. Furthermore, he was apparently imbued with the somewhat romantic spirit of "return to the soil," which has its extreme form in the Brook Farm experiment. He was, of course, much more practical than that, but at the same time, he had an idea that the old culture and training should be combined with the practical life of everyday work, and that is the main drift of the 1862 law.

On the other hand, the 1890 law is a blunt repudiation of the education that avows as its object an escape from labor into a world of speculative leisure. It is a flat rejection of all the subjects and methods supposedly essential to an elegant and leisurely culture. It is a clear and definite break with tradition.

As a result of this qualified and hesitant attitude in the 1862 law the modern land-grant college, with its definite and specific purpose and with its enormous influence on all educational thought and progress, had its root, not in the law of 1862 but in the laws of certain States, notably Michigan; while in the case of every university and some colleges founded upon or aided by the land grant of 1862 the funds were diverted to purposes which that law did not expressly contemplate and the "leading purpose" was ignored or inadequately treated.

Such was the situation when in 1890 a new grant was proposed. The 1890 law as originally drafted contained few or none of the differences from the 1862 law that I have pointed out. But representative persons, whose influence could not be ignored, indignant at what they regarded as perversions of the previous law, and in their thought tending strongly toward trade-school ideas, modified it radically, deliberately omitting certain subjects, enumerating those that might be taught under the fund, and placing the word "only" before the enumeration.

It is these differences of underlying animus in the two laws constituting our charter that make a harmonious interpretation of them so difficult. And yet such harmonious interpretation must be made in defining our scope and function, for the second law refers to and incorporates the first as a part of itself. In the end, too, it is fortunate that two forces have been represented in these laws. The vague, halting, and sometimes perverted application of funds on the basis of the 1862 law has been corrected, not alone by the 1890 law and its interpretation, but by the discovery that modern conditions were responding in wonderful fashion to the processes of vocational education as blazed out by the strict-construction agricultural college. On the other hand, the separate agricultural college whose organic state law required that in it the graduate of the common school might commence, pursue, and finish a collegiate course, began to discover under the influence of the university loyal to agricultural education and developing it according to pedagogic laws that both laws, except in the one case of providing for the needs of the colored people in the South, everywhere distinctly postulated colleges, not agricultural high schools or trade schools. So far as concerns the character and scope of the instruction on the land-grant

foundation there is not one law for the separate college and another for the university, but there is the same law for both. Whatever is required of the latter is also demanded of the former; whatever is prohibited to the former is also forbidden to the latter.

It is in attempting to define the term "mechanic arts," a term now practically as obsolete as its counterpart, "liberal arts," that we find especial help in a comparison of the two laws. The term is evidently, in the 1890 law, simply taken over from the 1862 law, without any attempt to fix the meaning of a practically obsolete term; and at a time, too, when nearly, or perhaps, quite all the colleges were giving instruction, not in trade work, but avowedly in engineering. In the 1862 law, the term is clearly not subordinate to the term "agriculture" but coordinate with it, and the two are used together to include the whole realm of action of the "industrial class." In this law, agriculture is that part of all industry that produces from the soil, while "the mechanic arts" serves as a designation for the great transforming and transporting industries. No one who reads the law seriously can for a moment think that the term is subsidiary to that of agriculture, and is satisfied by the teaching of farm mechanics. It includes with agriculture the whole realm of industry treated from a college standpoint, and only this interpretation will harmonize the requirements of the two laws.

While then the practice of the two classes of schools in the past has diverged somewhat in response to the two divergent forces operative in creating the two laws, it is now recognized that a single direction was given as a resultant, and in this direction all land-grant foundations must move.

In a conversation with the president of the Carnegie Foundation, I was asked this specific question: "Why do you not, you men of the separate agricultural colleges—why do you not formulate and state definitely what your function is?" And so I have undertaken, in response, to formulate in accordance with this harmonious single interpretation of the two laws, a statement, as follows:

"First. That the series of United States laws creating so-called land-grant colleges and formally accepted with the accompanying funds by the several States, constitutes a binding contract and charter which neither the State itself nor we as administrators for the State, have any power to evade or disregard.

"Second. That the State laws may direct the disposal of state funds to provide whatever instruction local conditions may demand, yet they can not so modify the nature and character of the land-grant institutions as to vitiate the requirements of the contract entered into by the States with the nation.

"Third. That the United States laws, in defining the character of the land-grant institutions, specifically stipulate that, except in expressly stated cases in the South, these institutions, founded and maintained under United States laws, shall be colleges; that is, institutions doing work above the high school and bestowing degrees for such work.

"Fourth. That these laws prescribe the scope of such collegiate instruction on the land-grant foundation and affirm one leading object, namely, education for industrial life and citizenship, all other education under the land-grant endowment being by inevitable implication subsidiary and tributary.

"Fifth. That these laws further define the nature of this collegiate instruction, not optionally but affirmatively and imperatively, requiring that instruction to be not merely in the great productive industries, agriculture, horticulture, forestry, etc., but also and on an equal footing in the great industries that transform and transport things and produce food, clothing, and the like from the raw material which the farmer has produced.

"Sixth. That this industrial education in the mechanic arts, so required by the law of all institutions that in their maintenance exist wholly on the land-grant fund, though being collegiate in grade, is and can be only what is in modern terminology known as engineering in its various forms of application.

"Seventh. That, considering the foregoing interpretation of the law, and considering further the present and future service of the people, we regard the function of the institutions on the land-grant foundations, so far as provided by national endowment, as one and the same, whether embodied in a university or separate in location and organization.

"And finally, that this function, affirmatively defined, whether to be carried on by a university or by a college, is to give such collegiate instruction as will fit for leadership in industrial life, whether on the farm, in the factory, on the railway or highway."

In a discussion of the function and scope of the land-grant college it has seemed to me that a statement of that kind would be proper. I also desire to put it forth here that it might have such consideration as can be given it before presenting it in the general meeting of the association.

A. B. STORMS. It seems to me these resolutions are very pertinent and extremely important in view of the request from the chairman of the Carnegie Foundation for such an expression by us. If it would be in order or desirable that we take some formal action here recommending some such statement by the general association, I would be glad to make such a motion.

D. W. WORKING, of West Virginia. I would suggest that we make a motion that the chair appoint a committee of three to go over that statement with its author for the purpose of studying its phraseology rather critically and being able after that critical study to state it more positively and amend it in some slight particulars.

HOWARD EDWARDS. I think that is a very valuable suggestion and I should like to see it carried out. I have no desire to project before the convention an ill-advised or ill-worded set of resolutions which we will not have time to consider.

The motion was made and carried.

The chairman appointed on the committee Howard Edwards, D. W. Working, E. A. Bryan, of Washington, and W. E. Stone, of Indiana.

K. L. BUTTERFIELD. President Storms spoke of organizing departments along the lines of subjects. Now, we have, of course, the research and experimental work that is to be carried on through the experiment stations, the regular college teaching, and the rapidly growing type of work which we call extension work. Thus we have there three rather distinct types of work to be cared for by the institution. The question of effective organization for the whole institution, it seems to me, involves not only the question of organizing departments by subjects of study, but also some cross organization. I would like to ask President Storms how, in his opinion, these different types of work may be correlated so that there is administrative unity and yet a fairly clear division of labor?

A. B. STORMS. It seems to me the gentleman has practically answered his own question in the way he has put it. I am no oracle, and we are in the experimental stage ourselves and are watching with a good deal of interest other institutions and their method of organization. One or two things, however, seem to be fairly clear, and one of them is that it is unwise as a matter of policy to have work in animal husbandry, for example, carried on under independent heads not closely correlated in the different lines mentioned. For example, for the extension work in animal husbandry, it seems to me very desirable, as in other lines of extension, that it should be really an extension of

college ideas and college teaching; of course, made simple and practicable, but it should be a real digest of the college work, and therefore we try to keep a vital relationship between extension work in the field and in the department at the college. It is a relationship that is mutually helpful. A college department totally isolated from the field and from the people will become academic and abstract. But especially the extension worker should be in such relationship to the college department that he will be constantly under its inspiration and its instruction, so that the subject-matter which the extension worker is covering will be critically examined and approved by the head of the college department. Beyond that, in the field, he, of course, has to be under the extension head. The extension head is the administrator. Of course, there is abundance of opportunity for slight difficulties to arise. Whether they do or do not depends upon the personality of the men concerned. The question of unity under the head of the college department in subject-matter and methods approved, and all that, is important. Otherwise there may be conflicting teachings and the extension work may become superficial. And the same thing will be true if the station is undertaking to carry into the extension work any scientific subject. It ought to be approved and critically examined by the head of the corresponding science department in the college.

So far as station work is concerned, I believe Chairman Jordan's position, or that of the committee which he represented a year ago, is the sane policy; that experiment-station workers should give their entire time to the experiment station, but the head of the department in the college may very well, and perhaps best of all, supervise the experimental work to be carried on in his subject. Below him it seems to me as though the time of the assistants should be given to one field or the other and that they will become more and more efficient, according to their capacity, if they be single-minded than if they be double-minded.

ENTRANCE REQUIREMENTS FOR LAND-GRANT COLLEGES.

J. L. Snyder, of Michigan, read the following paper:

The rapid development of the land-grant colleges was due to the fact that they appealed to the good sense of many educated people, as well as to the needs of the industrial classes. They started at the bottom and were suited to the educational conditions of the common people.

Country boys 40 miles from a high school were not told to go home and get two years of a modern language, mathematics up to trigonometry, a year of physics with a full note-book, showing laboratory experiments, etc. If such requirements had been a condition for college entrance, not many men present of technical training would have gone to college.

The land-grant colleges exist for the people, not for the faculty; not for the few who can meet high entrance requirements; not for the industrial classes alone, but for all, rich and poor, learned and unlearned—for anyone and everyone who has capacity to learn, and moral character of such standard as to permit him to safely mingle with pure-minded, labor-loving people. These colleges were established because the higher education at that time had nothing for the masses—for the people who worked with their hands for a living.

Of course, no substantial progress can be made without organization. This means standards for entrance; standards for promotion to the various courses; standards for graduation. These standards should not be arbitrarily fixed by a faculty, or board. There is another party to be considered. The people who support these colleges and for whom they exist must not be ignored in fixing these standards. I am not speaking now of the standards for the various academic degrees conferred by colleges upon their graduates. The land-grant colleges having assumed or presumed to grant the same degrees as granted by the traditional long-established institutions should not lower the standard, and thus bring into disrepute the academic degrees of long and honorable standing. These degrees when granted by the newest type of schools should represent

practically the same amount of work as the same degrees conferred by the literary and classical colleges. But in the fixing of requirements for entrance, in deciding beforehand who shall and who shall not have the advantages of these schools, it is obvious that the people who support the school must receive the first consideration. The democratic principle of the "greatest good to the greatest number" should not be ignored when standards for entrance are decided upon. The application of this principle does not necessarily mean that the colleges should try to reach all directly, but it may mean that all can be reached more effectually by the college giving its efforts to the training of a comparatively few, who shall instruct the many by means of books, lectures, and by providing an effective and wholesome leadership.

The greatest work done so far by the land-grant college has been the training of leaders. One school in each State can necessarily do but little in educating all the people. It should prepare the teachers, the writers, lecturers. This part of its work is imperative. It may also, and should give practical training in short winter courses, institutes, corn and fruit trains, and in various other ways to as large a number as possible. But the young men of exceptional energy and ability should be given an opportunity to come to the front. If they have access to high schools, they should be expected to take advantage of these schools before applying to the colleges for entrance. Many States, however, have been able to furnish high-school opportunities to only a small percentage of their youth. If the agricultural and mechanical colleges in these States were to admit only such applicants as had full preparation to enter the freshman class, they would have very few students—not enough to command the attention and support of the people of the State. The land-grant colleges must have students—they must reach the people, and if the young men and women do not have opportunities at home to prepare for entrance to the freshman class the college must take them as they are, and give them this preparation. Just as rapidly as possible the responsibility for this preparation should be thrown on the local communities. The public schools should give this preparation, and the colleges should encourage them to do so and at the earliest possible date transfer the entire burden of such work to their shoulders. In the meantime, however, the college should stand to and render assistance and save as large a number as possible.

The land-grant colleges are local institutions. With few exceptions, they draw very few students from outside their respective States. They strive to minister to the actual needs of their own people. This being true, it seems obvious that the standards for entrance to these colleges should be governed largely by the educational conditions existing in each State. For instance, Michigan has more than 500 high schools. School districts are compelled to furnish high-school privileges, or pay the tuition of students if required to go to other districts or cities for such instruction. This brings high-school privileges very near to practically all the people. It has taken three-quarters of a century under exceptionally favorable conditions to develop such an educational system. Many other States have done equally as well if not better, while a large number, some young in years, others compelled by the presence of two races to maintain a dual system, can not for many years to come maintain anything like a complete system of secondary education. In such States and in all States, our colleges should meet the educational needs of their constituencies. They should do this in their own way. They should fix their own standards. This problem is distinctly local, and should be settled by people on the field, and not by national conventions.

The product of these institutions, however, is not local. It passes from State to State bearing a certain label and claiming recognition on the strength of this trade-mark. The public is interested in this product. It has a right to expect and to insist that it be properly labeled. The value of the label is not fixed by the college which places it on its product. The B. S. label and the A. B. label have a certain traditional value the world over. No institution has the right to place this label on an inferior product. If local conditions compel a college to admit students with little preparation, it does not justify the institution in maintaining a correspondingly low standard for graduation. If those who enter college with little preparation aspire to graduation, it is only fair to them and to the educational world that they be compelled to spend the same time and effort to secure a degree as that required by the older and larger schools. Hence, let local conditions govern the entrance requirements, but in the conferring of degrees let every college adhere to the standard as to the

time and amount of work established and maintained by the institutions of recognized merit throughout the country. The prevailing standard for entrance to the freshman class in colleges and universities of good standing is usually fifteen units, a unit standing for one subject pursued throughout the school year, with five and not less than four recitation periods per week. These fifteen units must consist of a certain amount of work in English, Latin, modern language, mathematics, history, science, etc. These requirements have been fixed arbitrarily by the colleges and universities. The effect has been both good and bad—good in stimulating schools to greater efficiency, and bad in laying too much emphasis on those studies which serve as a foundation for courses in the institutions of higher learning and not enough on those subjects which prepare students to earn a living after their school days are over.

However, without any encouragement or assistance from those who fix the entrance requirements and thus dictate in a large measure high-school courses, certain practical subjects, such as manual training, agriculture, domestic science, and domestic art, are fast pushing their way into our high-school courses. Nearly every good high school in the country is now teaching one or all of these subjects. The instruction in these technical branches is given by experts—by teachers who have had thorough preparation and who appreciate the disciplinary as well as the practical value of this work. In the near future these industrial studies will occupy not a secondary place, as now, but a first place in all our high-school curricula.

Is not the time at hand when our higher institutions can afford to recognize this work and allow it to count under certain conditions as a part of the fixed number of units required for entrance? It seems to be a peculiar and strange condition which insists that large quantities of shopwork shall be taken in order to graduate from certain degree courses and at the same time refuse to accept shopwork of much the same character as any part of entrance requirements to such course. The same condition is equally true with such subjects as agriculture, domestic science, etc. The objection to the acceptance of such work, when properly done, as a part of entrance requirements is simply the last remnant of the old idea that such work had no educational value and should not be classified under the head of education. The land-grant colleges years ago exploded that idea, and now should be the first to recognize this work in secondary schools and to give it proper credit in the scale of units for entrance.

The question of entrance requirements has been under discussion frequently of late, because of certain standards insisted upon by the secretary of the Carnegie Foundation. He is charged with a great trust, and it seems to me that he is handling an exceedingly delicate and complex problem with rare skill and discretion. His field of operation is a new one, and he should be given every assistance possible by educational leaders. Even low requirements for admission to a freshman class brings sadness and disappointment to many aspirants, so disappointment to many institutions will be the result whatever may be the requirements fixed by the Carnegie Foundation. The worthy student is often the one who fails to meet the requirements for entrance, and likewise the worthy institution will be very often the one turned down by the office on Fifth avenue. This is no reflection on anyone, but merely the natural result of an administration where standards are and must be fixed and adhered to. While it is no doubt very desirable to the officers of a college that it be admitted to the benefit of the Carnegie pension fund, yet there are other things much more desirable. Of the two, it is much better for a college supported by taxation to retain the confidence and loyal support of its constituency than to have the benefits of the Carnegie Foundation. Is there not grave danger that our colleges of agriculture and mechanic arts, in their strenuous endeavor to secure the benefits of this fund, may lose that public confidence and support which is so essential to their progress? They have been eminently successful because they have kept close to the people. They have anticipated their needs and tried to render helpful assistance. Their success in the future will be in direct proportion to their ability to retain this helpful spirit and in return retain the confidence of their patrons. Their hope is in the people. Their success is not dependent upon the endowments of wealth or the privileges of pension funds. If our colleges are true to the people, the people will be true to them. If they are not able to qualify for acceptance as beneficiaries of the Carnegie pension fund, the States to which they belong will, no doubt, ere long

establish pension funds for their benefit. Our colleges should stand true to their constituencies, let come what may. If they can receive the benefits of this magnanimous and magnificent fund without sacrifice, well and good; but if standards are to be unduly raised and other changes made which will lessen their efficiency, they should freely and willingly decline to make the sacrifice.

Church schools may deny their parentage and may shatter their traditions of sacred and hallowed memory in order to become beneficiaries of this fund, but our colleges are of royal lineage; they belong to the sovereignty—the people—and can not afford to either lower or raise their standards beyond that which is for their best interest to gain the favor of any endowment or beneficence, however great.

As the public educational system develops in each State standards for college entrance will advance. They should be sufficiently high to serve as a stimulus to secondary schools, but not so far advanced as to create a gap between the public-school system and institutions of higher learning.

W. E. STONE. I agree so well with what has been said by President Snyder that I do not care to controvert any of his statements. I prefer rather to emphasize some of the points in his paper. The land-grant colleges are, to my mind, more nearly the ideal of democratic educational institutions than anything we have in this country or are likely to have, and educational democracy is a thing we should cherish. We may do it by studying the educational needs of the community which we serve, but I do not mean to say that we should cater to whims or superficial demands or waste our means in doing things of little or no educational value. The colleges must be leaders educationally, and in so acting they must strive to establish high educational standards. While none of our colleges should attempt to set up a standard for entrance which is beyond the capacity of the better schools of the State, or which will operate to exclude any large proportion of public-school graduates, I deem it to be their duty, particularly in States where the public-school system is not well developed, to seek to constantly stimulate and uplift the standards of those schools and to recognize the best schools, so that the influence of the college should be felt all through the community as standing for scholarship and thoroughness and the best possible advancement in its educational requirements. Our colleges should, moreover, very carefully protect their degrees. If we are critical in this respect the degrees will come to stand for a definite attainment. The degree is essentially evidence of an educational standard, and ought not to be debased. Consistent action in this particular may mean that many of the colleges must have a large percentage of students who are not candidates for a degree. That is well, if necessary. Those who are candidates for a given degree ought to meet practically the same requirements, no matter where they may be or in what State their college may be located.

On the other hand, after establishing high standards of admission and attainment for candidates for degrees, the colleges should make provision, in my judgment, for giving entrance to students of all classes and all preparation, who come to college wanting something which they can not get anywhere else. Now, that is a very large undertaking; it is beyond the means of many of our institutions to do, perhaps, but that is what they should try to do. This is essentially the democratic spirit of education which should exist in all of our institutions. If we can supply the young men and women of our State with useful education or training which is going to react to the benefit of the State in citizenship and in industrial efficiency, and which is not available elsewhere in the State, then we ought to do it, taking care first that those who come have the best preparation which they can get, and then, so far as our rules will permit, extending the hand of welcome to all who find in the institution something of use.

I do not think the true educational policies of the land-grant colleges are going to be stamped or dominated by the attitude of the Carnegie Foundation. I like something of the spirit of President Snyder's paper, and feel that we are not to look to that source for protection, but that we are to look first to our home people, our home interests, and our home needs, and strive to do that which is best for them. In due time the Carnegie Foundation will recognize that the work of our colleges is thoroughly educational, in the true sense, and that it will become, in the process of evolution, of sufficiently high standard to merit even their approval.

We hear a good deal these days in protest about the influence of the colleges upon the high schools in shaping the curriculum and functions so that they shall lead up to college entrance. This criticism can be met by broadening the entrance requirements of our colleges. If there is anything in the high-school curriculum which gives skill, training, and intellectual power, then that ought to be recognized, in a degree at least, for entrance to college. The high schools are not supplemental and subordinate to the colleges; they are public institutions themselves, established for public use and training of youth without regard to colleges. As you well know, a large proportion of high-school pupils do not go to colleges, and their training should have reference to this fact. High schools should be kept as public training places for the public, in my judgment, without particular reference to the demands of the colleges; and the colleges should adjust their needs and their requirements to the curriculum which is best suited to the functions of the school. The colleges should accept for entrance, in part at least, any systematic training which has given to the student intellectual power and the ability to do things.

It sometimes happens that there comes to Purdue a man of mature age, who has been out of school a number of years, who has been earning his living, who can do a man's work at anything. He may not have graduated from a high school, but I regard such a man as quite as well qualified to do college work, assuming that he has knowledge of certain antecedent branches, as the raw high-school boy who has never had any experience in dealing with men or the problems of life.

Admission to college should be on a broader basis than the present conventional requirements, recognizing a high-school curriculum of greater use to the average pupil, and the equivalent value of personal experience in practical affairs.

The whole problem of college entrance requirements is, after all, something which can not be standardized for the whole country, and I do not approve this idea of attempting to standardize everything in education. There are state problems, local problems, and they should be studied with two things in view: First, always, the educational idea, the uplift, the striving toward the highest and the best thing that each locality can produce; and, second, the coordination of the college work with actual conditions in that particular locality. If we keep these two things in mind and strive for them earnestly, we need not be very much concerned, generally speaking, about standards, or the requirements of the Carnegie Foundation, or anything of that sort; because we shall be doing true, honest, conscientious work, and the best work which can be done for our respective communities.

D. W. WORKING. I have recently been making a little computation having reference to this Carnegie Foundation. I found that the appropriation made by the legislature of Kansas for the support of the agricultural college is more than 4 per cent on the entire fund at the disposal of the Carnegie Foundation.

Now, if that could be computed for the country over, and the resources of these land-grant colleges be capitalized, how big that capitalization would be compared with the pitiful \$15,000,000 of the Carnegie Foundation. I think President Snyder has made a good point in insisting upon fundamental loyalty to the people as the primary subject in the conduct of these institutions.

HOWARD EDWARDS. I would like to say a word in regard to entrance requirements, differentiating them into two classes. There are certain things which all college work rests upon and which are integral parts of a college course. We have, for instance, English and mathematics. You can not do college mathematical work without having some mathematical work preceding it. Now, in considering what shall be the entrance requirements, I think that the classification between those things which are essential for further work and the general requirements should be made very distinct. In fixing our entrance requirements we have tried to reduce the first class to just as low a number as possible. In the institution I represent we have placed in the first class 3 units in English, $2\frac{1}{2}$ units in mathematics, 1 unit in history, 1 unit in modern language work, and 1 unit in physics. That is the classification on the one side, the individual things that must be known, the body of knowledge with which a man must come to the college in order to take up the college work, because those things are continuous. Now, we have made up the remainder of our entrance requirements by doing just exactly what has been suggested; namely, by valuing a large range of knowledge—science, history, economics, civics, language, and the practical work—practical agriculture and shopwork. To the man who comes from the farm, no matter whether he has had farm training in the high school or not, if he has the requisite knowledge of practical agriculture we will give a certain amount, I think it is a unit, just for that practical knowledge on the farm. In the same way, we give a man who comes from the shops one unit for his practical knowledge in that direction.

I doubt whether it is to the advantage of many of the state institutions to go upon the Carnegie Foundation. At the same time, that is incidental. What I want to insist upon is that there is a clear distinction which meets the practical needs of the land-grant institutions, and is in harmony with the democratic tendency that President Stone suggested.

E. A. BRYAN. I think we have reached the point where academic freedom has extended itself as to the requirements for admission. Stanford University undoubtedly led the way, but Harvard and some of the older institutions have followed, and there are very few institutions now which do not recognize a wide range of possible subjects of the secondary grade which may be presented by candidates for admission to the colleges or universities. The main thing is, I think, that we have a sufficient quantity and quality within the range generally recognized by the most advanced institutions. I think we should require the same quantity of studies in the schools that would be required of any of the better high schools in the land. In other words, 30 semesters' credit or 15 units is by no means too high a requirement for admission to our land-grant colleges of any kind. If we have sufficient freedom within these limits, then that quantity is about right. And these subjects, I think, should be studied in some secondary school, in the agricultural high schools, or other high schools. I do not think that we need to feel that there is any danger with the Carnegie Foundation if that is done. I think the foundation undoubtedly has a liberal attitude so far as the number and variety of subjects required for admission is concerned. It is allowed in the case of such great universities as Harvard and Stanford. It certainly would be allowed in the land-grant colleges as well, provided there is a sufficient quantity of work done and very well done.

I think a mistake was made in the early period of the agricultural colleges in having too low requirements for admission. I think the interests of the people as well as the interests of the institutions require that high standards for admission should be maintained.

A. B. STORMS, of Iowa. I do not think we ought to encourage the idea here or let it get out from here that we are taking a sort of critical and uppish attitude toward the Carnegie Foundation. That Foundation is undertaking a great public service in trying to standardize educational institutions, and it is the only agency that is aiming to do so. They have set before themselves a voluntary task to do so, but it was one that needed to be done and needs to be done, and they are pursuing their work with great courage and, I think, with great discretion, and are likely to arrive at results that will be very valuable. In my institution we do maintain and for the present shall maintain a fourth year of advanced preparatory work, so to speak, for the graduates of three years' high schools and carry them over the freshman's year. I believe we ought not to yield too easily to the complacent notion that we can not and ought not to establish a regular standard for admission. This talk about getting nearer to the people is most of it bosh. There is no greater service that we can do the people of our constituencies than to establish correct educational standards, and perhaps no institutions are nearer to the people or better able to do that than we, I mean the land-grant colleges. We can do no nobler service to the public-school system of the State than to establish those standards and maintain them. We have no moral right, when the public schools are in any adequate degree able to do this work, to invite their students to leave their own high schools and come to us. Missouri is an illustration of the beneficial stimulative effects of institutions like its university fixing the standards, and the high schools responding to them, as they have done in that State. That is a splendid service to the cause of education, and we can render no better service to the young men and women who wish education in a vague and hungry way than to make definite requirements of them. I entered a high school in my eighteenth year; I got through in a little less than three years, being a little more mature than the average, and I am profoundly grateful that no misconceived educational philanthropy opened a side door into a college for me. I think every young man will be better in the end if he is held to right and rigid requirements. We may make provisions for the young man of 25 who wants some special work, but let us do it for him, of course, as a short-course student and not as a candidate for a degree, and protect the degree by protecting the entrance requirements. In the end we will have to come to that. The logic of the situation leads us that way, and we are fighting against our best interests in taking an unfriendly attitude toward the value of the standards which the Carnegie Foundation is standing for; we are simply fighting against logic and against truth, and in the end truth and logic will prevail and we ought to welcome that conclusion.

The section adjourned until Thursday, August 19, at 2 p. m.

AFTERNOON SESSION, THURSDAY, AUGUST 19, 1909.

The section was called to order at 2 o'clock by J. C. Hardy, chairman pro tempore.

OFFICERS OF THE SECTION.

The chairman named the following committee on nominations: E. A. Bryan, of Washington; K. L. Butterfield, of Massachusetts; and R. W. Silvester, of Maryland (see p. 99).

MEDIUM OF PUBLICATION OF SCIENTIFIC WORK OF THE STATIONS.

E. Davenport, of Illinois, then brought up the subject of a medium or journal for the publication in a scientific way of the results of experiment station work, which subject he said had been under consideration by the committee on station organization and policy of the section on experiment station work of the association (see p. 48).

On motion the matter was referred to the general session of the association with the approval of this section.

RECOMMENDATIONS REGARDING EXTENSION WORK.

K. L. BUTTERFIELD. The committee on extension work in presenting its report to the association instructed the chairman to move the adoption of the report. There are three distinct recommendations in the report that would seem to require the action of the association. All these, I may say, were recommended last year. The first refers to an amendment to the constitution providing for adding to our association a section on extension work. The other recommendations are, first, that Congress be requested to grant the franking privilege for bona fide extension publications; and second, that the association indorse the idea of asking Congress, as soon as it may seem wise, for a federal appropriation for extension work.

The committee asks to have the report adopted with the understanding that such action need not commit the association to an indorsement of every word or item of the report. The committee has outlined in its report a plan for a proposed bill in Congress to cover this matter of the appropriation. Undoubtedly different individuals in the association will differ widely as to the details of this bill. But this outline was presented as embodying, in the judgment of the committee, the principles which ought to underlie such a bill. It was the hope of the committee that the association might feel like adopting the report because of the very definite recommendations which it makes and because of the main idea with regard to the scope and character of a federal appropriation.

The first recommendation of the committee to be considered is that there shall be organized in this association a section on extension work. We went over this matter carefully a year ago and since then have had it under advisement as a committee. We have consulted with a large number of men who are interested and especially the men who are now undertaking the extension work. We come to this association at this time with a renewed and unanimous recommendation for the new section.

G. E. FELLOWS, of Maine. I do not like to appear as standing in the way of progress; decidedly I should prefer to be on the other side. I see some objections, however, to forming a new section in this association. I think the formation of a new section might tend to prevent the progress which we all desire. In the first place, it has been arranged now on our program that we may have two sections meeting at the same time, as we do now in the afternoon. If we had a third section we should be under the necessity of having a longer session or at least a session lasting over more days, or of having three delegates from each institution instead of two; and another difficulty would arise which I think could not be obviated by having three delegates or having longer sessions, and that is, that this question of extension work is one in which the presidents of the association are vitally interested. They must be vitally interested or it can not succeed. I myself would like to be present at all discussions on the question of extension work. I could not do that if there were a third section. My duty is here in the administrative section. We do not have

any more profitable topic for discussion than extension work in this administrative section. To be sure, we should have a director of extension work, and he might come here if he wished to, or if we could send him; but to take extension work entirely away from the administrative side of the colleges and have a new section meeting at another place and at another time, it seems to me would be unfortunate. I do not think it will prevent the growth of the extension work to retain that feature in this section; it does not belong to the stations; it belongs to the administrative officers of the institution, to the college section. It is primarily a college topic.

L. H. BAILEY. There are two questions involved in this report of the committee on extension work. One is the general argument, on which they found their proposition, and the other comprises three recommendations growing out of it. I do not see how we can discuss any one of the three recommendations without discussing the argument and the fundamental proposition on which it rests. If we accept the proposition of the committee as to the fundamental importance of extension work, then it becomes only a question of ways and means and the proper opportunity or time in which to adopt the other part of the report. If I understand the report of the committee aright, it considers that the land-grant colleges have a tripartite function, these functions being coordinate one with the other: The college work or nucleus, the extension work, and the experiment station work. If I gather correctly the attitude of the committee, it does not consider extension work to be "college" work any more than research work is "college" work. In cases in which the experiment station is connected with the college or with the university, the president of the college or university is naturally the administrative officer to a greater or less degree of the experiment station at that institution. For myself, I should not accept the premise that the extension work is college work in the sense in which we have defined college work in this organization. I take it that this association represents the essential work of the land-grant colleges, and I think it is indisputable that the essential work of the land-grant colleges is of the three kinds, representing three types of mind and three lines of public usefulness. I recognize, as President Fellows says, that there is a difficulty in having a three-ring circus. I do not know that there is more difficulty with three rings than with two. I should like to attend every one of the section meetings, whether experiment station or college. I should have the same feeling if there were three rather than two; the delegates are compelled as a matter of fact to take their choice. The questions of larger policy which concern all three sections would naturally come up in the general sessions of the association.

I am convinced that the time has come for us to add the third section, in order that the association may exactly and adequately represent what is coming to be the proper and necessary work of the land-grant colleges; and if we do not adopt this course now we certainly shall be forced to adopt it within a very few years. I should like to see the association accept the report of the committee as its general line of policy, leaving the question as to when it shall adopt the three special recommendations for further discussion. I am not at all sure that the time has now come when we should adopt all three of these recommendations for immediate action. Perhaps if we work out one in each year it would be quite sufficient. I am ready now to adopt the first one, which is the adding of a new section. I think this would tend to clarify our ideas by defining the purposes of the colleges of agriculture. I can not conceive how a land-grant college can function properly unless it develops in these three lines. And, on the other hand, I can not conceive of any kind of work coming up in the future that would not fall into one or the other of these three divisions.

G. I. CHRISTIE, of Indiana. Last fall, at the time of the association meeting in Washington, a large number of extension workers gathered and formed a temporary organization. It was the feeling at that time that there was a great need for these men to come together and discuss problems of extension work. We have in extension work a field that is new and altogether unorganized. We have at the present time no two States following exactly the same line of work; perhaps we never will. Different States are attacking similar problems in entirely different ways, while I feel, from my knowledge of the extension work, that they might be dealt with in the same way. If we could bring our extension workers together, and if we could have an opportunity to thrash out the problems that confront the several workers, great good would result.

The time is now ripe for an extension section to be formed in connection with this association. Extension work is so intimately and directly connected with college and station work—and it affects the policies of these institutions in every way—that we can not afford to have extension workers come together at any other time than at the time of the meeting of the Association of Colleges and Experiment Stations. For this reason, as secretary of the Extension Worker's Association, I am here to ask that you give your consideration to this matter of allowing us some opportunity to come together and thrash out these problems of extension which should be thrashed out at the earliest possible moment in order that the work may be better organized and promoted.

H. L. RUSSELL, of Wisconsin. I feel that this appeal to us is one that should not go unheeded. It seems to me this child is already born, and it is a question whether or not we are going to adopt this new addition to our agricultural family. The work of extension is, to my mind, one of the most important lines in which colleges can engage. It is one to which the people will respond, and success will as certainly follow in the extension work in the experiment stations as in the academic work which is carried on within the walls of the institution. I believe, with Dean Bailey, that we should have this tripartite arrangement of agricultural college work. It seems to me if we accede to this request and recognize that in allowing this extension line of work to be introduced into the work of the agricultural colleges and experiment stations we will be doing ourselves a service, as well as them. These people will sooner or later get together in some organization or other; and so far as I am concerned, I would rather see the extension workers affiliate themselves with this association than to go into the Association of Farmers' Institute Workers. It is true that the farmers' institute worker is engaged in extension work. Still, in some States that work will not be closely affiliated with the extension work that is carried on under the college, and I believe the time is already ripe for the organization of another section of this sort. I appreciate the point which has been raised by President Fellows as to the difficulty of administrative officers keeping in touch with all of these lines of work, but the program committee can arrange the papers so that matters of common interest are presented at a time when there will not be a conflict, and there will be a sufficient amount of sectional material that is of more detailed character, in which the administrative officer may not be interested. I feel certain that it would be an advance move for us to organize a section of this sort.

D. W. WORKING. In my own State of West Virginia, shortly after we established the extension department in the college of agriculture, our board of agriculture, which supports the farmers' institute, appointed a man to undertake essentially the same sort of work. Subsequently they saw their error and abandoned the work, leaving the field to us. There is a demand for this sort

of work; it comes up from all parts of the State, I think, and the extension workers who are in the field feel the need of all the legitimate encouragement they can get. Now, if this association, which stands as nothing else stands for the work of the agricultural colleges and experiment stations, will recognize the dignity and the importance of this work by providing a section for it, I believe that it will in some places, like my State, double our power to serve the public, and in serving the public we are serving the institution. This association will have put strength in my hands and given me greater power by dignifying the work that I am undertaking to do through this creation of a section. As an extension man I have now no right here; I must come here as a representative of the college, not as an extension worker. There happen to be three extension men at this association, and we think that there might well be 30 or 40 of us here next year if there is a section which will give us a chance to present our own work in our own way, because we learn some things about the extension work now that our presidents do not learn, because they are away from the center and we are right close up to it. The problem is with us personally, and we are the men who can work it out and discuss it in detail.

C. F. CURTISS. There is another principle involved in this question to which I would like to call attention and which I consider exceedingly important at this time. That is that as the extension work develops in the various institutions I believe one of the most important problems that will arise will be the proper coordination of that work with the college and station work. I think it highly important that the organization of station workers be properly coordinated with this association. Their work is a part of the work of the land-grant colleges, an essential part; it is conceded by all. And their organization ought likewise to be a part of this association. Without that coordination the extension workers are naturally going to affiliate themselves with the farmers' institute work, and in doing so they will not be recognized and, in fact, will not be a part of this association. That will tend to draw away their work and interest from the college and station organization. That, to my mind, would be a serious mistake. I recognize, as many of you do, the difficulties we have had in properly adjusting our present plan of organization, and I recognize the satisfaction that has grown out of this plan. But we formulated this plan of organization at a time when we did not have the problems before us that we have to-day. Since then a new line of work has developed. There are these three important lines that are permanent and fundamental, and there appears to be a very good reason why we should recognize this third additional line now and give it a place in this organization.

I realize the force of what has been said concerning the vital interests of the college presidents in extension work. That is true, but the deans are also vitally interested, and many of the deans are directors, and there is some conflict now between two sections meeting at the same time. There is scarcely any argument that can be raised against the creation of another section of extension work that does not equally apply to the existing sections. I think we will have to adjust that in the arrangement of the program. There must be, I think, a recognition of this extension work. If we recognize it now we will be in a position to direct and coordinate that work and to get better results than if we postpone recognition and allow or require the extension workers to form an independent organization, or to affiliate with the farmers' institutes.

W. E. STONE. It is not quite clear to me what is the wisest course to pursue in this matter, and I only rise to point out some considerations which may help us to get a more comprehensive view of the situation. I think we all agree

that this extension work has come to stay in our institutions; come to grow and to occupy a very important place. At the same time we are all bound to recognize that at the present time it lacks organization and system. We do not know exactly what we are going to do with it. A large number of our institutions have not yet taken it up, so that it can not be said at the present time that extension work stands on anything like the same footing as does the station work. I am thoroughly convinced that there should be a place in our organization and in our proceedings for the extension idea and ample opportunity should be given for its discussion and presentation. Whether this should be in a separate section or be included, for a time at least, in the deliberations of the college section, I am not prepared to say. But a consistent attitude of the association would be to give liberal hospitality to this subject and this work in the college section for a time; then when it has developed into a definite form, if we are convinced that there should be a separate section, let it be made.

I want to be distinctly understood in my position, that I believe this work should have every encouragement which it merits in the association, but it was only a little while ago that the association believed that it had too many sections and divisions. There were, as some of you may remember, a large number of divisions of the work, and the results were unsatisfactory. Because of this condition the constitution was revised and after a good deal of painstaking study of the whole situation it was decided to have only two sections. Provision was made, as you will find by examining the constitution, for either of these sections to form as many divisions as it might wish, so that the way is quite clear at the present time, without changing our constitution, to welcome and properly care for this new work. This may be amply provided for by giving up a day on the program for the discussion of extension matters. I am sure we can not select any better general topic for next year's program than this. It seems to me the conservative policy would be to take some action of this kind for a year or two, until we see a little more clearly where we stand.

J. L. HILLS, of Vermont. While I yield to none in my appreciation of what extension work is able to do for the farmer and am anxious to see it established in my own State, personally I feel that to give this movement, still in its infancy, a mature status in this body would be a mistake. One does not expect a child to occupy the same standing as that of a parent in the family. My personal judgment leads me to favor a subsection rather than the making of a new section. The constitution permits any institution to send any number of delegates. The college may send its president and likewise the head of its extension department, and these latter can, it seems to me, do as effective work for the time being in a subsection as in a section. Then, after a few years, when the movement has become thoroughly organized, if it then seems desirable, it can be accorded the dignity of a full section.

Furthermore, I raise the point whether, as the constitution now reads, this section if constituted should not be represented upon the executive committee. I query whether this association is ready to accord to the representatives of the comparatively new movement membership in this important committee.

K. L. BUTTERFIELD. Our committee did not discuss that point and nothing was said to indicate that it would be necessary to have members from this section present on the executive committee.

C. E. THORNE, of Ohio. There is a point that was briefly alluded to which I think should be considered in this matter, and that is that this extension work has already taken two thoroughly different lines, one of college extension and one of research extension, and in providing for future growth it would be neces-

sary to keep this in mind. These two lines of work are at present largely different and are likely to remain so and each will want its recognition in any new provision that may be made.

J. L. SNYDER. In our institution there are two lines of extension, the one carried on under the direction of the board as a part of the college work under the head of farmers' institutes, with a superintendent who is a member of the faculty. We have also a department of agricultural education, and one of the important functions of that department is to introduce the teaching of agriculture into our public schools and to carry on a home reading course. We have these two distinct lines of work, and just which should be represented in an organization of this kind I am unable to decide at present. I wish to call the attention of the members to a fact which seems not to have been emphasized, namely: This organization at present is made up of administrative officers—the presidents of the colleges and directors of the stations—and if we add this new section we bring in on equal footing subordinate officers. They are administrative in a certain sense, but subordinate to the members who are already in this organization. Whether that would be wise is a question. Many of you remember that years ago we had subordinate divisions. After discussing the matter for several years, it was decided that it would be better to have only sections composed of administrative officers. I think every one who has been a member of this association, both before and since that change was made, will admit that our organization has been much more effective since that change was made. The facts are that very few institutions will consent to send more than two delegates. I venture to assert that the record will show that the attendance has been as large since it was limited to administrative officers as it was before, and the more sections we add the more we weaken our organization. Now, understand me, I appreciate the greatness and value of this extension work. It should be organized; there is no question about that. The superintendents of this extension work should come together, but I think they should have more time than they could have as a section of this meeting. I believe they should organize separately and perhaps affiliate with the farmers' institutes; but I am not convinced of the wisdom of organizing another department in this association. It might be wise to organize as a subdivision of the college section, but I do not believe it would be wise at this time to form an independent section.

W. C. LATTA, of Indiana. While I agree with all the recommendations of the committee, I am myself inclined to approve the remarks of Professor Bailey and President Stone. The difficulties referred to by President Snyder would multiply as time goes on. This work is bound to grow, and the institutions which meet the demands of the people are bound to take care of it in some way, and the sooner the work is thoroughly organized and correlated, it seems to me, the better for the work and all concerned.

J. H. CONNELL, of Oklahoma. Twenty years ago at a meeting of this association we had half a dozen or more sections, and those sections, in my judgment, served a very useful purpose in clarifying and developing the work of the land-grant colleges during their formative period. I believe that much the same thing will probably result if we recognize this new feature of our collegiate work and give it a name and a place in the association. We are attempting extension work along so many lines that it is a confused mass, and the extension superintendents need to get their heads together and learn of each other. Anything that this association can do that will contribute to such a conference will be well worth while. From the standpoint of a State struggling to solve

this extension problem, I am ready to vote not only for a reference of this matter to the general body, but for its adoption.

E. DAVENPORT. I instinctively felt opposed to the proposition when I read on the program that a proposed amendment for a new section was to be considered, but I want to confess that the argument has won me over entirely to the other side, and I am going to vote for the new section.

K. L. BUTTERFIELD. I do not want to take up the time of the section, because the arguments have been brought out very clearly by those who have spoken so far. But I want to call attention to two things. The difficulties mentioned are recognized by the committee. We recognize that there is a certain anomaly, perhaps, in establishing a section of extension work when we have so few extension workers, and when the work is so new; and we recognize other difficulties such as President Fellows spoke about. But we feel that these are minor things that can well be swept away because of the larger interests at stake. There will be some conflicts. But the fundamental thing that we contend for is the recognition of the extension work as coordinate with these other two lines of work. That is the real heart of the matter, and that is the real reason why we are so earnest in presenting this question to the association. It has been suggested that we wait a little in order to see the drift of things. That is precisely what we do not want to do. We want to give to the present extension work the help that will come out of its recognition. It has been suggested that the administrative officers of the extension work will be subordinates; that may be true in some institutions as the work starts, but fundamentally the administrative officer of the experiment station is on precisely the same footing.

So, waiving these minor considerations, the question at issue really is, in my judgment, just what place we are willing to concede to the section work, as a growing phase, and a phase that is soon to be of the utmost significance, of the work of the land-grant colleges. We contend that the time is here when that recognition should be given. We admit that at first the work may be rather weak and the attendance may be small, but we believe that in two or three years after such a section is actually organized the work will be thoroughly on its feet. And nothing will do more to put it on its feet as a section and as a department of our work than the organization of a section. If that is done a large number of men will be here next year, and in future years that number will be larger; if not, I shall be very much disappointed. The committee feel that these objections, many of which are real, may well be swept aside in order to give recognition to extension work as coordinate with these two other lines of work. That is the question at issue. It should be decided now for the sake of the work of the college.

The recommendation of the committee that a separate section on extension work be formed was referred with approval to the general session of the association.

K. L. BUTTERFIELD. The second recommendation of the committee is one that was made a year ago and has not yet been acted upon by this section or by the association, namely, that Congress be requested to grant the franking privilege to bona fide extension publications. I may say in this connection that it seems to feel that this recommendation is in a sense attached to the general idea of a federal appropriation, but it is not necessarily so, and may well be discussed as a thing by itself.

The recommendation was approved.

[Bull. 228]

K. L. BUTTERFIELD. The third recommendation of the committee is similar to that made a year ago, namely, that we state as the policy of the association that we are in favor of a federal appropriation for extension work. It is not in the minds of the committee that this is a propaganda that should be pushed with undue haste before Congress, but I think all of us feel that it is something that ought to be acted upon by the association at this time.

Your committee believes thoroughly that the Federal Treasury should be asked to assist in supporting extension work. We have already, by recommending the organization of a section, recognized what has come to be the common mind among us, I believe, that really this extension work is coordinate with the other lines of work. Now, we feel that it ought to be so recognized by Congress and by the public. The fundamental principle, as I understand it, of the Morrill acts and of the various appropriation acts, as the Nelson Act, is that of federal aid supplemented by state support. We ask that the same principle precisely be applied to this coordinate branch of the work of extension. It seems to us that it is a fundamentally correct position and argument. Furthermore, we think the time has arrived when it should be taken up because of the diverse ways in which the States are going at the work, and that the same things which have given us a certain measure of uniformity and standardization among the land-grant colleges, and in the work of the experiment stations will result from a federal act which defines extension work, and which immediately, in the public mind, gives it a certain scope and dignity. The work is important enough to have national character, national direction, national significance. We are quite aware that a good many States are taking up the matter, and it may be argued that they will all do it eventually. But I should reply that that is precisely the history of experiment stations. I am sure it would have constituted no valid argument against the Hatch Act, but rather would have been in its favor, to say that after twelve or fifteen States had organized experiment stations the thing was put upon a national basis and given national support, and that immediately the whole country was alive with research work. We feel that the same thing will come about here because essentially the same propositions are at stake.

In our outline of the proposed plan we are not at all tenacious about any parts, but have endeavored to recognize certain principles that we regard as sound. In the first place, we have suggested an appropriation of \$10,000 a year direct to each State from the Federal Treasury. That is not a large amount, and it will immediately, when the bill is passed by Congress and goes into operation, put the extension work into every land-grant college in the country, and thus the whole work will be nationalized. Otherwise there will be a good many States that would not take up this work at this time. Further, this \$10,000 will be ample to carry on the work in some States for several years. Then again, we suggest that the States which wish to carry the work further may do it by money from the state treasury, assisted from the Federal Treasury up to a certain limit determined on a per capita basis.

In reply to a question by J. L. Snyder, of Michigan, President Butterfield stated that the proposed bill had been framed with the idea that the funds were to be turned over to the college to be administered through the proper administrative officers of the college.

On motion the matter was referred to the general session of the association, with approval of the general principle involved in the recommendation.

The report of the committee as a whole was then adopted.

THE FUNCTION OF LAND-GRANT COLLEGES IN PROMOTING COLLEGIATE AND GRADUATE INSTRUCTION IN AGRICULTURE OUTSIDE OF THE COURSE OF THE GRADUATE SCHOOL.

H. J. Waters, of Kansas, presented the following paper on this subject:

The activities of the land-grant college have fallen into three principal groups, viz, (1) agriculture; (2) engineering and mechanic arts; and (3) domestic science.

These fields of activity are so diverse in their present state of development that it will be difficult to treat the institution as a whole in any concise way. I shall, therefore, confine myself to the problems relating to the agricultural group. This group has been subdivided into (1) extension, (2) special instruction, and (3) research.

Two or three decades ago the teacher of agriculture was only partially successful in attempting to apply his knowledge of chemistry, physics, botany, geology, etc., to the farm practice of that day. Then his knowledge of these fundamental sciences was limited and his acquaintance with the practices to which he sought to apply them was perhaps even more restricted and unreliable. Then the number of students was small and the demands from the farmer for information by letter, through articles in the agricultural press, and at the farmers' institutes were exceedingly limited. The chief problem of the college was to get enough students of a grade equal with the other departments of these institutions to make teaching inspiring.

At this moment the outcome of the enterprise projected on a national scale, by the passage of the Morrill Act, was filled with some uncertainty. These forty or more teaching institutions, brought into existence as a result of this act of Congress, in a period of the greatest agricultural expansion and development in our history, had not yet found themselves. The farmers were too busy bringing the fertile expanses of the West under the plow, and were too much interested in what sort of new machine for increasing man's efficiency on the farm would next be brought forth, to find these institutions or to be interested in them, whatever merit they may have possessed.

We can attribute, however, only a part of the meager support which the agricultural side of these institutions received from the farmer during this early period of their existence to his interest in other things and to his lack of appreciation of the value to him and to his children of the sort of education sought to be imparted. Any discerning student must recognize that the inherent difficulty lay in the institutions themselves, or, rather, in the lack of preparation of the men who were teaching the agriculture. Perhaps it is more charitable to say that the difficulty was in the subject itself, or, even more correctly speaking, in the limited knowledge which the world had of the subject at that time.

At this point, through the passage of the Hatch Act, an experiment station was established in connection with each of these colleges. Thus a research institution was united with a teaching institution. These teachers, having little else to occupy their time, began in earnest the study of agriculture through the agencies afforded by the experiment station, and while we are sometimes inclined to complain of the amount and character of the work thus far accomplished with the Hatch funds, yet considered as a whole, and especially in its relation to the teaching of agriculture, it is little short of marvelous in both quality and quantity.

One thing of fundamental importance soon came about—the teachers of agriculture of the country acquired as extensive and accurate a knowledge of the subject in its various phases as the farmer himself possessed. Added to this was his knowledge of the fundamental sciences, however limited, which gave to the teacher an advantage over the farmer in dealing with his business affairs that was immediately apparent and decisive.

At this moment, and for the first time, the agricultural departments of our land-grant colleges became effective and began to shape agricultural practices. In the meantime the prairies were put under the plow, and where a few years before had grazed herds of low-grade cattle or even wild buffaloes, presenting no agricultural problems, were now farm homes, fields of grain, and orchards. An agriculture under wholly new conditions of soil, climate, transportation facilities, etc., presented a thousand new problems.

Simultaneously with the practical exhaustion of the public domain came a rapid and decisive rise in farm land values, and the shifting of the whole great

agricultural problem from that of extension and expansion to that of conservation and utilization. Thus almost overnight it ceased to be a problem for the immigration bureau and the inventor of labor-saving machinery, and became one that could be solved only by the wisest economist and scientist.

The farmer's problems were shifted from the machine factory to the agricultural college.

So, suddenly, as though by magic, the agricultural teacher found himself in the very center of things; found his class room crowded with students, his mail filled with requests for advice, and demands for newspaper articles, feature stories in magazines, and calls to attend farmers' institutes and run educational trains, and conduct demonstration farms, in the aggregate far in excess of his ability to answer even though he devoted his entire time to this class of work. In other words, the situation had suddenly changed from a limited attendance of students and a special lack of interest on the part of the farmer to an attendance which taxed the facilities of the institution and an interest from the outside which was overwhelming.

The colleges have met this enlarged responsibility fairly and successfully, although in a manner that is wholly temporary. The last five years has been an era of expansion in teaching and in extension work comparable with the expansion in farming of two decades ago. The student has been held and made to do good undergraduate work, and the farmer has been reached through extension lectures, demonstration trains, leaflets, etc.

While all of this was happening and while the college was adjusting itself to its new relations and enlarged duties the experimental work and better grade of teaching have been permitted to suffer somewhat.

These recent years have been years of yielding to the pressure from the student and farmer for instruction and information, rather than in building up a sounder system of agricultural education and research.

In the last five years we have been traveling largely in a circle, or thrashing the same straw over again. We have been giving the world the benefit of the discoveries of science for the past fifteen or twenty years. That this is a duty which the college owes to the farmer no one questions for a moment, but to do this alone or even chiefly is fatal to progress. The farmer will soon catch up with the college teacher, and then all opportunity for leadership will be lost.

Happily, however, the colleges are rapidly catching up with the increase in students and are getting their extension work so organized that it need not seriously interfere with their other duties.

Just as the real progress which these colleges have made and just as all the real success which they have achieved were based on the researches of the experiment stations and the scientific bureaus of the world, just so will the future progress rest and depend upon even more rigidly scientific investigations.

While it is an admirable work to turn out young men trained for leadership on the farm and capable of going among farmers as teachers of the correct systems of husbandry, and to lead young men who come to the college to a better knowledge of the subject, after all the greatest work these colleges have to do is to equip men with the proper knowledge and the necessary inspiration to advance the world's knowledge and to supply these thousands of teachers with something to teach.

It has been a fundamental mistake to assume that the duty of the experiment station is solely or even principally to benefit the farmer directly. A larger responsibility rests upon it—that of making an exact science of agriculture, so that it may be successfully taught in the college, the high school, the grammar school, the farmers' institutes, and on demonstration farms. If the grade of instruction in the technical subjects is to bear comparison with the instruction in academic subjects, the teachers of agriculture must have better training than they are now getting. In the last decade the investigations conducted by these technical men, added to reasonably good teaching, has given them and their work high standing in the institution and abroad. We have reached, however, a period in our development where acceptable research can not be carried on with meager equipment and limited preparation on the part of the investigator. Likewise the quality of the instruction in agriculture will be more closely scrutinized and a higher standard will be required than heretofore. No greater fatality could befall the whole enterprise than for it to be placed on a lower plane than the work with which it is associated.

It is only by keeping the quality up to the best that is offered in other lines that the strongest students in our universities and land-grant colleges will be

attracted to agriculture. Any other situation will result in filling the agricultural class rooms with students of mediocre or inferior talents.

It is easy, however, to point out the necessity for better trained teachers and investigators, but the way to bring this about is not so simple.

It is now quite possible in our better institutions to enforce a rule for the classics, mathematics, pure sciences, modern languages, history, economics, and other academic subjects, to the effect that no one shall be appointed to a teaching position who has not received a master's degree, and that the door of even an instructorship shall be barred except to those who have won their doctorate. But anyone with experience in administrative affairs knows that such a rule would be wholly impracticable in the technical departments of our land-grant institutions at this time.

The truth is that until quite recently the main difficulty with the engineering schools, except the largest and except those which were located in cities, where a large consulting practice could be readily established, was to find men who would consent to teach at all. The demand for men in the practical field has been so insistent and the opportunities for a distinguished career so large that the stronger or more ambitious men and those especially of constructive ability have been attracted to the practical field, leaving the men of less intrepid temperament and men whose tastes leaned more to the academic life to do the teaching.

Similarly situated have the agricultural departments found themselves, especially within the last five or ten years. The call to activity outside of the college has been too loud and the salaries at which many of these men could begin their work have positively precluded the colleges and stations from holding them for positions of rank and emolument, much less for graduate study. As it now is, men begin work in the colleges and stations in agricultural lines, with the ink on their diplomas scarcely dry, at higher salaries than are commanded on the average by men with an advanced degree in academic lines.

The United States Department of Agriculture, in the era of unparalleled expansion through which it has recently passed, has, in self-defense, been forced to pay an astounding price for fresh graduates. Through this means many men have entered the government service poorly prepared and all opportunity to pursue graduate work has been cut off.

The outcome of it all is that the grade of teaching in these subjects is not being improved as rapidly as it is in other lines, and especially those lines in which there is less expansion and a less active outside demand for men.

Another force has been at work which, though almost imperceptible, has had a deterring influence upon the quantity of graduate work pursued, viz, the fact that the men in many instances who have pursued graduate work in agricultural lines have been among the weakest of the men turned out from the colleges—men who could not secure a position when freshly graduated, or had not the ability to hold a place when once it was secured for them. Each time these men would lose their positions they would drop into some institution for a year or more of graduate work, try another place, fail, take more graduate work, and so on. It has therefore not unfrequently happened that the poorest teachers and investigators were the men who had devoted the most time to graduate study.

Opportunity and responsibility, as already pointed out, have been crowding too hard upon many of the stronger men to permit them to do systematic work for which they would receive academic credit.

I have had strong students come to me to inquire if long and severe graduate work did not unfit rather than fit men for successful teaching and research in agriculture. Of course they failed to realize that no amount of study could take the place of ability and that the difficulty was with the man himself and not with his training.

THE CHARACTER OF THE GRADUATE STUDY REQUIRED AND WHERE IT SHALL BE FOUND.

At the present moment there is a very great difference in the practice of institutions with regard to the graduate work in agriculture. The two principal differences in the practice are as follows:

First, where the student in his undergraduate years receives his instruction in agricultural subjects with a moderate amount of the fundamental sciences, such as chemistry, botany, physics, physiology, etc., and who for his graduate work takes more of such of these pure sciences as are more directly related to

the specialty which he has elected to follow. Thus, the student in animal husbandry will pursue courses in the university in evolution, embryology, etc., if his inclinations are in the direction of animal breeding, or take up a much more elaborate study of organic chemistry, physiology, physiological chemistry, histology, etc., if his inclinations were toward animal nutrition, and so on.

In a similar way the soil man would emphasize physics, inorganic chemistry, physiology, and geology, while the plant man would be interested in the advanced courses in the physiology and morphology of plants, in bacteriology, organic chemistry, meteorology, etc., and so on throughout the whole range of specialties.

It is true these subjects, or at least those which the graduate in agriculture would pursue for the first year of his graduate study, would not be ranked in the course of liberal arts and sciences, but have been usually classed for the agricultural student.

Another plan, not yet much in vogue because of the limited facilities of the colleges for giving graduate work, is to make up both majors and minors in the technical subjects.

The most common method, and the one which seems to be most generally acceptable, is to elect the major in the subject in which the student is to specialize, and to select his minors from the general science courses which are intimately related to these major subjects; thus, if it would be animal husbandry, with a specialty along animal nutrition lines, the major subject would involve the study of nutrition itself with the thesis based upon investigations in this particular line, while the minors might be along physiological or chemical lines, or a combination of the two.

It is a mistake to think that the colleges of agriculture of the country are not prepared to do good graduate work. The truth is, with the facilities at hand properly utilized, no other departments of our universities and land-grant colleges have such excellent facilities for the highest grade of graduate work. This is largely on account of the association of the experiment station with the college and the unusual opportunities that are offered the graduate student for high-class research in the line of his major subject.

The advisability of utilizing the experiment station facilities for graduate work might at first seem questionable. On a moment's reflection, however, it is apparent that any man properly prepared for graduate study would be able to take some special and detailed problem, one intimately related to some main investigation already being conducted at the station; one which through the investigations in progress is already well defined and outlined, and in two or three years' time work it out satisfactorily and completely.

Instead, therefore, of the colleges offering scholarships and fellowships for men to do superficial work along disconnected lines, let the graduate work be organized in a given institution along the lines in which that institution is especially strong and in which it is specializing, so that the theses will be real contributions to the complete and ultimate solution of the main problems under study. This enables the experiment station to secure the services of good men at little or no expense, and gives to the graduate student the material for work which the station alone would be able to supply. An illustration of this: At the University of Missouri last year, Mr. Moulton was registered for his master's degree, with his major in agricultural chemistry and his minor in animal husbandry. In the nutrition experiments being conducted by the experiment station there were a large number of samples of fat, selected from animals on widely different nutritive planes, of different ages, and from different parts of the body—all with a definite and important history. Mr. Moulton, for his thesis, was required to make a minute study of the chemical and physical properties of these fats, and in that way contribute in an important degree to the main problem under investigation. These samples of fat were incidental to the principal investigation, and had a man selected this study of the fats independently of the investigation being conducted at the station, it would not have been possible to have secured samples from animals with known histories, and from animals in which the other parts of the body were being equally minutely studied. In the one case his thesis was contributing to the discovery of fundamental principles, in the other the results would have had only a statistical value.

Another instance bearing upon the same line was that of Mr. Evvard, who was likewise registered for his master's degree, with his major in animal husbandry and his minor in physiological chemistry, and had for his thesis one phase of the behavior of the animals already referred to on different nutritive planes. He

was able to take one phase of the feeding problem under study, and at very slight expense secure data which the station could not have taken the time to secure, and which illumined the whole problem under study.

Thus, at every experiment station there are many such problems, too minute and detailed to take the time of the men in charge of the main investigations, but absolutely important to the final and complete solution of these problems, with which high-class graduate students can successfully deal. Moreover, offering such opportunities is the best possible way to secure students of this grade and to keep them at work until they have accomplished something of real merit, and have fitted themselves for a useful career as teacher or investigator.

THE COOPERATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE NECESSARY.

The colleges of agriculture and the experiment stations of the country can not successfully cope with this situation unaided. However much they may appreciate the value and importance of graduate study for men who are to take positions with them, they will not be able to hold the strongest and best of their students so long as the Federal Department of Agriculture is willing to put a fresh graduate into a position of responsibility at an initial salary of from twelve to fourteen hundred dollars.

I have no disposition to quarrel with the Department of Agriculture, for in the period of expansion and development through which it has just passed and out of which it is now perhaps emerging there was no alternative but to take the best men the colleges could supply and pay them such salaries as were necessary to command their services.

We have heard more or less talk of the Department finding it necessary to train its own men, etc.; that the men turned out from the colleges are lacking in preparation. The latter is conceded without question, but it is, of course, quite impossible for the Department to attempt to train men except to do a particular thing in a particular way, just as every college and station, and individual for that matter, finds it necessary to train a man for a special duty. Broadly speaking, the Department has no facilities for training men and must rely upon the colleges entirely for this work. But if the Department is to be able to secure from these colleges men that are soundly trained so that they will learn quickly to do the things which are required of them, and trained so that they will do them well, so that they will have sound judgment and will develop into strong investigators, it will be necessary for it to cooperate with the colleges and demand better preparation of their men before they are to enter responsible positions.

With the Federal Government taking a firm stand on this question it would be particularly easy for the experiment stations and the colleges to do the same, and to say to the fresh graduate that the door to appointment to responsible positions is through graduate study, and that the road to promotion and increase in salary, rank, and opportunity is through further graduate study.

Thus the duty to insist upon good graduate study does not devolve alone upon the land-grant colleges, but equally upon the Department of Agriculture, which has come to be the largest employer of the best men the colleges train.

For the land-grant colleges to fail to provide advanced courses of real merit, each institution along such lines as it has the men and equipment for, and to surrender all advanced work to men in pure sciences and in the universities, is to openly confess their own weakness or lack of appreciation of their largest opportunity for real leadership and a failure to realize their highest duty to the classes whose welfare they were created to promote.

L. H. BAILEY. I think it is really unnecessary to discuss this very suggestive and able paper of Dean Waters, since he has covered the ground so well, and since we probably all agree with his positions. There was a time when the public—on whom we depend for support—had difficulty in appreciating the value of even a four-year college course. The time is now coming rapidly, if in fact it is not already here, when the constituency of the colleges of agriculture are ready not only to grant the full four years' preparation in agricultural work, but also to approve two or three additional years. I find this sentiment to be growing among the farmers. They begin to feel that post-

graduate work is a necessity for young men who are to teach farmers. The whole character of the farming business has greatly widened in its scope in the past few years. Questions that formerly were asked of college and station men are now asked by farmers of each other, and they are able to answer these questions themselves. Now they want more knowledge. It is true, I grant, that much of the work for which students have received masters' and doctors' degrees (at least masters' degrees) in the colleges of agriculture has not been of the best character, and Dean Waters has very truly expressed the reason for it. A man who is incompetent, who is lazy, who is unfortunate in securing a job, or is merely weak, is likely to fall back on the college of agriculture and demand his right to a master's or doctor's degree, and to remain on for one, two, or three years. It was with this feeling that I was led to say last night that we must now exercise a selective process in deciding what men shall pursue postgraduate work in a college of agriculture. I do not think it at all follows that because a man has secured his degree of bachelor of science in agriculture he is thereby competent to be a candidate for the master's degree or the doctor's degree, because the institution, in giving a man a master's degree or a doctor's degree, put its approval on the man. It recommends him for station work and college work; in many cases it is for that reason that a young man pursues postgraduate work. It is the obligation of the college of agriculture to be very careful in its recommendations, just as careful when they are expressed in the form of a degree as when they are expressed in the form of a written letter or certificate. I would strongly recommend all heads of departments not to accept a student as a postgraduate unless they are satisfied that he has the postgraduate stuff in him. It is nearly always possible, when a man has graduated from an institution, for the instructors to form a fairly accurate judgment as to whether he has staying power, whether he has growth in him, and whether or not it will be wise to encourage him to expend time and money to take a postgraduate course. If the applicant has the postgraduate mind and the general ability and staying power, then of course the addition of the work represented by the master's or the doctor's degree distinctly qualifies him for work in the world. But, if he does not have the intellectual character, the addition of the second or third degree can not help him; in fact it may do just the reverse. The first point, therefore, that I wish very strongly to emphasize in commendation of this admirable paper is that we must begin to discriminate among candidates for postgraduate work.

What I had in my notes to say in this discussion was well said by Dean Waters—that each experiment station does become and must remain a medium to provide postgraduate work in the colleges of agriculture. I do not like to think of the experiment station in a college of agriculture as having a wholly separate and segregated existence. I feel that the men who are employed on the Hatch and Adams funds should not be engaged in teaching undergraduate work. I should prefer that the salaries should not be divided, and in our own case they are not divided. On the other hand, I would not eliminate all contact of students from the men who are supported on these funds. In our own case the men who are supported on the federal experiment station fund, whether Hatch or Adams, while they do no undergraduate teaching, have the privilege of taking postgraduate students, it being the understanding that these postgraduates are to be put into the work which those men or departments normally are doing as a part of their research. But they are under no obligation to take any particular number of men. The officer may accept one man or ten, depending on the facilities and the nature of work that is under investigation. Thereby

the experiment-station officer has the teaching contact, which I think is a very essential factor to his intellectual progress without the burden of the administration or having his attention divided by a great number of undifferentiated undergraduate students. I feel that an officer of the experiment station can very well be made the head of a department in a college of agriculture without at all really trespassing on the energy devoted to his research. I should like to see every department in a college of agriculture have at least three officers, one officer who, with his particular assistants, devotes his time to research, another officer responsible for the academic work, another responsible for the extension work. One officer will have the headship of the department. The general policy or theory of all the work is to be determined by the head of the department, or by a conference of these subordinate heads. Now, I see no reason why this head of such a composite or tripartite department should not be an experiment-station officer as well as a college officer. In fact, there are some reasons why he would better be an experiment-station officer. The head of a department is supposed to have his tenure of office comparatively undisputed; but if public clamor interferes with the tenure of any man's office, it is likely to be of the one who does not often appear before farmers' gatherings or who is closely engaged in laboratory research work. It is fundamentally important to laboratory research work that there be continuity of effort. Therefore, other things being equal, it tends to insure stability of investigation to place an experiment-station man at the head of a strong department. How much time such an officer shall give to administrative or extension work is wholly an internal question. I should hope he would give practically none to the details of it, but assign this part to one of the other officers; the officer, for example, who is responsible for the college teaching could handle all student administration, the general policy only being determined by the head of the department. It does not follow that these other officers would be subordinate in their rank as professors. I should like to see a dozen full professors, with full salary, in every department of college work if we could afford them; and it ought not to be difficult to avoid conflict of authority.

I am not arguing, however, for distribution of administration, but am merely trying to illustrate the fact that the experiment station can be articulated into the college of agriculture in such a way that it will become a real part of it and not at all interfere with the research or investigation work under the Hatch or Adams fund; that it will, in fact, rather aid the work, and at the same time constitute essentially a postgraduate organization or department. I would not eliminate postgraduate work from departments that are not founded in any way on the Hatch or Adams fund. I should expect every head of a department, if, in fact, not every man who is doing teaching in a college of agriculture, to prosecute investigation of some kind. If he is not engaged in investigation he really can not teach. But those who are engaged in research work should nevertheless not be cut off from touch with bright advanced students, and whose contributions, if carried out in the way in which Dean Waters indicates, will be a contribution not only to the postgraduate work in the college, but to the continuing constructive work of the experiment station itself.

My two points, therefore, are these: (1) That we should now begin to discriminate in the acceptance of postgraduate students, taking only those who, we have reason to believe, have postgraduate minds; and (2) that the experiment station can become in a very essential way a part of the postgraduate work of the college, without in any way interfering with its autonomy as a research organization.

THE FUNCTION OF THE LAND-GRANT COLLEGE IN PROMOTING AGRICULTURAL
EDUCATION IN SECONDARY SCHOOLS.

E. A. Burnett, of Nebraska, presented the following paper:

The function of the land-grant college in promoting agricultural research and higher education is well defined and the lines of work fairly well established; but, while we nearly all agree regarding the obligation of the college to promote secondary agricultural education, we are not yet agreed upon the organization under which it shall develop. We all agree that research is vital to the promotion of higher agricultural education, and we freely acknowledge the debt which such education owes to the scientist, the experiment stations, and to the teacher who has collected and molded this scattered knowledge into pedagogic form, making it the basis of our present day agricultural instruction.

Broadly speaking, the colleges of agriculture have a vital relation to all those questions which make for agricultural progress. The college has made its influence felt through the experiment station, working out problems for the improvement of agricultural practice through students trained in agricultural science and through extension work in agriculture with the more progressive farmers. The 15,000 graduates now at work are its most effective missionary force; in fact, much of the present demand for the extension of agricultural education comes from the success already achieved by men who have had the advantage of agricultural training and have applied the teachings of agricultural science to farm practice.

The aim of most agricultural colleges very properly has been to offer instruction in agricultural science rather than in agricultural arts, and this has resulted in turning out a professional rather than an artisan class. The curriculum has been based on the theory that students could not begin the study of agriculture efficiently until they had at least an elementary training in all the sciences more or less related to agriculture. Under this theory agricultural subjects were placed largely in the third and fourth year of the course, which prevents any extended study of the subject without a postgraduate course and postpones the study of agriculture until a majority of those entering college have left the institution, so that they receive no benefits from technical instruction unless they have entered college as special students. Happily, this practice is rapidly being outgrown, and many agricultural subjects are now being taught in the first and second years of the college course.

It is granted that agricultural colleges serve but a few of the young men and women of any State, and that primary and secondary schools must furnish the only opportunity for the average boy or girl to secure an education. If education is to fit men and women for life, the public school should be made to serve the most important industries represented within its constituency, and to provide that class of education which best fits the pupil for his future duties and responsibilities. The basic industries of the country community have to do with the production of crops, the management of land and live stock, and the making of homes. A nation where 35 per cent of the people live in the open country, and where all classes are dependent on the prosperity of agriculture, should have a secondary-school system adapted to the needs of its constituents. The specially organized colleges can not adequately meet this need. Their courses of instruction are not fitted for boys and girls of high-school grade. The great mass of boys and girls never attend college. Graduation from high school ends their school days. The present high schools do not articulate with the agricultural colleges in a way which makes it easy and natural for the student to enter this college when his education will permit. The "trail from the rural school to the college of agriculture" is not easy to find. The high-school courses are shaped to lead to the college of liberal arts, and this college stands waiting with extended hand, so that the boy who turns away from it to enter the college of agriculture must have a well-defined purpose in his mind before he starts to college. The agricultural high school would point the way and blaze the trail to the door of the college of agriculture and bid the student enter.

A distinctively modern idea in education is that it shall have a definite aim and purpose; not that all education shall be technical or professional or be purely commercial in spirit, but that it should specially fit the person for the particular life he is to live. It shall enable him to contribute to the uplift and improvement of life in general and to his special field in particular. The great need of the educational system of the United States to-day is a proper develop-

ment of the technical schools in agriculture and manual training—agriculture, because it engages directly so large a proportion of the people and is responsible for the food supply of the nations; manual training, because practical training in the shop gives manual skill, which is useful to every man engaged in industrial pursuits. Quoting from the Assistant Secretary of Agriculture, the Hon. Willet M. Hays: "The schools which to-day are dwarfed as compared with the functions they have to perform are those secondary schools or people's colleges which lead to the industrial vocations where large numbers are to be accommodated.

"It should be clearly recognized that the types of primary, secondary, collegiate, and graduate school to make a well-formed American educational system are all present, and that the weakness of the system is quantitative.

* * * The need of the hour is to build up the industrial vocational courses in our system of secondary schools."

The recital of what has already been accomplished or is in progress indicates a strong popular demand for secondary agricultural education. Quoting from "The American System of Agricultural Education," published by the Office of Experiment Stations, Circular 83, 1909 (copies of which are doubtless available at this meeting): "In the effort to meet the needs of the various classes of students, especially those who are unable to complete a full college course, the agricultural colleges have been unusually active in recent years in organizing short and special courses of different kinds. At least 52 of these institutions have organized such courses." A more detailed statement of some of these schools will be presented later.

But in spite of all these things done and in process, there is still "the agricultural problem"—the problem of universal application of agricultural knowledge; for the agricultural problem will not be solved until every man who lives upon the land has a knowledge of the fundamental laws of production relating to his business and manual skill sufficient to become a high-class artisan. So long as the land-grant college stands as the exponent of agricultural progress, it can not free itself from the responsibility of directing the lines along which progress is made. The problem, so far as it affects the mature farmer, is one of agricultural extension—the carrying of agricultural knowledge to all the people. So far as it affects the boys and girls of to-day, who will shape the policies of the future, it is a question of primary and secondary education. We should endeavor to work out the problem of secondary agricultural education in the same conscientious spirit which has prompted our early efforts in higher education, and if it be found that the responsibility for such education rests equally with the departments of public instruction of the several States we should still lend our best efforts to the extension of agriculture into all secondary schools which serve a rural constituency. It is surely the function of the agricultural college to foster so far as possible all those agencies which make for better country schools, more intelligent use of the land, and for a society better organized to upbuild the open country.

The student who is able to afford only a brief period of schooling in which to get some practical knowledge of farming to apply in his business and must then return to the land and put this knowledge into practice can not spend a large amount of time studying the natural sciences as a prerequisite to the securing of agricultural knowledge. He must begin with practical subjects and confine his study to such phases of those subjects as are adapted to his degree of education and mental development. Laboratory courses in stock judging, grain judging, dairying, horticultural practice, and many other subjects are not based upon science so technical as to delay their place in the curriculum beyond the first year of any college or university, nor in fact beyond the second or third year of an agricultural high school. These subjects seem to me more suitable and better adapted to secondary schools than to college work, and under a correct system of secondary education they would be transferred largely from university studies to the agricultural courses in secondary schools. The elementary principles of cultivation, of soil fertility, and crop rotations may be taught effectively to students of the tenth or eleventh grade, and no proper system of rural education will omit this instruction, since to do so deprives 90 per cent of the farm boys of receiving any instruction in these subjects which are so vital to rural progress.

There are, I believe, but two methods proposed for the extension of secondary agricultural education, namely, by enlarging the work of the present high schools to teach agricultural subjects and by the establishment of separate agricultural schools covering rather large districts, where agriculture and

domestic science may be taught, together with such academic subjects as are necessary to the rural high school.

Whatever the organization of these schools, it is essential that the agriculture should be thoroughly taught and that the courses offered shall form a sufficient part of the curriculum to make the subject of real economic value to the pupil. Secondary agricultural schools, to make any impress on the student, must make agriculture a dominant feature of the school and secondary to no subject except the English language. Not less than one-third of the course should be technical, relating to rural life; about one-third should be given to natural sciences, and the balance to the ordinary academic subjects. All of these subjects so far as possible, should be taught by laboratory methods or by actually doing the thing itself.

While many high schools are making an effort to teach agriculture, I know of none except the specially organized agricultural schools which have been able to offer a sufficient amount of agriculture to give it value in farm practice. This is not necessarily the fault of the teachers nor of the officers, but is due to the organization under which city schools have developed and from which they can not easily change. In nearly all States the secondary school has been built up to correlate with the literary courses of the university, and this system has become so thoroughly established that it is difficult or impossible to make any radical modification of this system.

Unless conditions are very greatly changed, it will be a long time before an adequate system of agricultural education can be introduced into the average city high school. The courses of study in these schools are strongly literary or mildly scientific. The agriculture taught is valuable as a culture subject and in establishing a liberal point of view toward agriculture and the industries. It is, in fact, a beginning in the modification of our school system to meet the needs of our present industrial life and as such it should be commended, but it is so far short of filling the needs of rural communities that it can not be looked upon as a solution of the problem.

The present cost of secondary education is as great as the average community is willing to support by local taxation. To endeavor to introduce courses of study in agricultural lines requiring expensive equipment, laboratories, and teachers would practically double the expense and place it beyond the resources of the average county or district. It therefore seems apparent that either the district of the agricultural school must be made larger than the average county or else this school must be supported partly by some outside resources, either private, state, or federal.

The school which endeavors to teach agriculture by the introduction of a single teacher who is also expected to give instruction in natural science, will not meet the demand of the present day. This demand is for technical instruction of sufficient amount to be of practical use in farm operations. Five hours of instruction for one semester in a four years' course is entirely inefficient for this purpose, and yet this is all that is thought feasible by the best high schools in the State of Nebraska. It is manifest, then, that in Nebraska either the possibilities for agricultural instruction must be enormously increased in the established high schools or some system must be established having a larger unit from which to draw support and offering a more favorable environment for the introduction of agricultural subjects.

If the secondary schools afforded an opportunity to study the subjects which relate to the arts of life, rather than forcing the boy to study foreign languages and higher mathematics in his preparation to be a farmer or a mechanic, many young men would be found in these schools to-day who at the age of 14 or 15 are now found in the industries or without occupation. Lacking this opportunity, many boys drift into the unskilled class, leaving the land because it holds out no promise for advancement and entering the trades to compete with the lowest class of labor. Through technical schools for the education of the young, thousands might be taken from this unskilled class and trained to become efficient in the industries. Every boy who is thus taken from the ranks of unskilled labor and transferred to the artisan class not only becomes a more efficient economic unit, but reaches a higher standard of citizenship, adding wealth and influence to the community and stability to the nation.

President Roosevelt, in his address "The man who works with his hands," said:

"We hear a great deal of the need of protecting our workmen from competition with pauper labor. I have very little fear of the competition of pauper labor. The nations with pauper labor are not the formidable industrial com-

petitors of this country. What the American workingman has to fear is the competition of the highly skilled workingman of the countries of greatest industrial efficiency. By the tariff and by our immigration laws we can always protect ourselves against the competition of pauper labor here at home; but when we contend for the markets of the world we can get no protection, and we shall then find that our most formidable competitors are the nations in which there is the most highly developed business ability, the most highly developed industrial skill, and these are the qualities which we must ourselves develop."

Few high schools serving rural communities are in position to offer more than one course of study, and much less to become pioneers in establishing agricultural courses requiring expensive equipment and high-salaried teachers. It is manifestly true that if agriculture is to be put, by a gradual process of evolution, into all the high schools serving rural communities, many schools must begin now to work out this problem, while much energy will be lost in trying to foster agricultural instruction in an environment which is not in sympathy with it or under conditions which are not favorable to its success.

It has been said that the greatest difficulty in introducing agriculture into the graded schools is the lack of efficient teachers. It might also be said that the demand is not uniform and the conception of what instruction is required is varied and vague. There are 100 high schools in Nebraska offering four-year courses of instruction and about an equal number offering three-year courses. Our best high schools are trying to offer five hours of agricultural instruction in a four years' high school course. Should it be proposed to increase this instruction to twenty hours in these schools next year, or five years hence, it would be considered impractical from the standpoint of the schools, and if put into operation would probably do infinite harm in disorganizing the present system without successfully introducing agriculture; yet five hours per week, or a total of twenty hours, of agricultural instruction throughout the second and third years in these schools would offer very limited opportunities to the boy desiring an agricultural education. If a generation is to be taken in making this change it could doubtless be accomplished, but even then it would seem that a few properly organized schools to work out the system would soonest accomplish the result. We will learn how to operate agricultural schools by doing it, working out the system in a few schools in every State, and may then take up the question of its extended application. Happily there are now a number of agricultural schools in the several States where this system may be studied and its efficiency determined.

These schools should be strictly secondary schools, in which the agriculture taught would be suited to the high school grades and not to college grades. It will be necessary that the district should be large enough to support this school by taxation, for, though the Federal Government may some time come to the aid of such schools, there should be no hesitation on the part of the State in establishing agricultural schools if they are based upon a correct educational policy and are efficient in proportion to their cost. Such schools will be worth all they cost in working out the problem of agricultural education and adapting it to the needs of other secondary schools. Much of the cost of one or two such schools might properly be charged to the State at large as furnishing an opportunity to develop a school suitable to further extension in rural communities. A bill was presented in the last Nebraska legislature to introduce agriculture and domestic science into twenty high schools in the State. This bill carried an appropriation of \$100,000 for the biennium, or \$2,500 annually per school. This bill failed to pass. It is to be hoped that when finally passed the bill will provide an equal sum to be applied to five high schools, working out the problem on the basis of about \$5,000 annually for each school for salaries and maintenance in addition to equipment and permanent improvements. This agricultural school will give instruction concerning the things with which the farm boy and girl are familiar from childhood. It will teach handicraft by doing things on the land or in the shop or laboratory. It will teach of the neighborhood life and industries and the practical application of this knowledge. The utility of this knowledge will hold many boys in school who, because they now lose interest in the classical and literary studies pursued, drop from school without sufficient training to enter the trades or to become skilled artisans.

There are in Nebraska about 300,000 pupils of school age in attendance at primary and secondary schools. From 15,000 to 18,000 of these are in the secondary schools, and a very much smaller number are in attendance upon colleges and universities. Of the 15,000 it is fair to presume that 40 per cent come from the country, and that an equal number will return to the country.

What would be the economic result if these 6,000 boys and girls could receive good instruction in agriculture and home economics and perhaps 1,000 of them return annually to Nebraska farms to put into practice the improved methods taught in the schools? If the results achieved were commensurate with the results of the present university school of agriculture, it would not be a generation before the demand would be overwhelmingly in favor of agricultural schools in every rural community, and production and profits from the land would be increased almost beyond computation.

The Nebraska School of Agriculture offers a three years' course of instruction. It is in session for only six months of each year, beginning in November and closing late in April. It accepts pupils with eighth-grade county certificates and also from ungraded schools, provided they have sufficient age and maturity. It receives many boys with one or two years' high-school training, and frequently has college graduates enrolled in its shorter courses. The schedule for men requires 109 hours' recitations and 45 laboratory periods, each covering one-half year. Of the 109 recitation hours and 45 laboratory periods required, 44 hours and 30 laboratory periods are devoted to technical subjects, 27 hours and 11 laboratory periods to scientific subjects, and 38 hours and 4 laboratory periods are devoted to academic subjects. The course in home economics devotes 22 hours and 28 laboratory periods to technical subjects, 24 hours and 14 laboratory periods to scientific subjects, and 46 hours and 4 laboratory periods to academic subjects. It will be seen from a study of the courses offered for boys that this school is rather severely technical, but it meets the need for a secondary agricultural school in the region where it is located, and offers instruction infinitely superior to a regular high-school course for young men who expect to become farmers and are unable to secure a college education. These courses are arranged with the idea of preparing young men and women to go back to the land rather than to enter the university. It is possible, however, for graduates to enter the College of Agriculture. The school, being in session but six months of the year, is adapted to young men who are required to work on the farms during the growing season. It is not well adapted to young men who do not need to spend the entire summer upon the land, and for whom a longer school year should be provided. If sending back to the fertile lands of the Commonwealth a few young men and women trained in agriculture makes for progress beyond the old academic system, it is proof that a much larger number should have advantage of this education, either in one or in several secondary schools.

There are several types of separate agricultural high schools receiving state aid, chief among which may be mentioned congressional district agricultural high schools and county agricultural high schools. Alabama and Georgia may be mentioned as chief among the States which have established schools in each congressional district. Alabama appropriates \$4,000 annually and Georgia \$7,500 annually from the State to each school for maintenance.

The Wisconsin plan may perhaps be taken as typical of the county agricultural high school. These schools are equipped at the expense of the county, but receive state aid to the extent of \$4,000 per year for each school, to be applied to running expenses. Four of these schools are now in operation in Wisconsin. The course of study in each extends over two years, and includes work in soils, plants, animal husbandry, rural architecture, blacksmithing, carpentry, and mechanical drawing for boys; cooking, laundering, sewing, floriculture, and home management and decoration for girls, besides English, United States history, civil government, and commercial arithmetic for both boys and girls.

California has established two secondary schools after the type of Minnesota and Nebraska, and Massachusetts has three or four such secondary schools. Several other States have secondary schools in operation conforming in type to some of the classes above mentioned.

The proper atmosphere for agricultural education can be secured only where the instruction offered is sufficient in amount to make the course strictly agricultural, where the equipment is adequate to give thorough instruction, and where the teachers are competent and enthusiastic. These conditions can be obtained only by the expenditure of considerable sums of money for laboratories, land, and equipment and by the payment of salaries adequate to command teachers specially trained along these lines.

The secondary schools in agriculture which have been established in connection with some land-grant colleges, as in Minnesota and Nebraska, have been an unqualified success. They can hardly be used as a type for the agricultural high school which is to be duplicated several times in a State, since

they have available equipment and teachers far in advance of what would be possible at a district agricultural school; nor can the results which have been obtained in these schools be taken as typical of the results which might be secured in schools of lower grade. They do, however, include all of the features which would be required in this smaller agricultural school. Such a school would endeavor to give only two or three years of agricultural instruction. Most pupils finishing this school would return direct to the land, but a portion of them would enter the land-grant college or possibly continue their agricultural studies in the secondary school connected with such college. The college could materially strengthen its work along the lines of agricultural science by transferring secondary subjects to its secondary school.

We are agreed that any secondary agricultural school must teach a number of academic subjects in a thorough and systematic way. It would seem feasible that these agricultural schools, where not attached to agricultural colleges, should be located in connection with some already established high school, where the academic studies could be taught, rather than to duplicate teachers and administration by establishing an independent school. It must be possible to find in every State many high schools serving country constituencies where the atmosphere is favorable to the development of agricultural education and where schools of agriculture could be joined to or affiliated with the high schools already established. This would do away with the objection that the agricultural high school is a narrow trade school. It would prevent the duplication of academic subjects necessary to the maintenance of entirely separate schools. It would ally the agricultural high school with the present system of education, preventing the development of two independent educational systems. The board controlling such schools might be organized as in the agricultural high schools established for judicial districts in the State of Oklahoma, where the president of the agricultural college, the superintendent of public instruction, and the president of the body governing the land-grant college make up the board of control, with a dean appointed to supervise all the schools of the State established under the act. It is, in my judgment, essential that the land-grant college shall supervise the agriculture taught in agricultural high schools and become responsible for the instruction offered in order that this instruction may reach the highest degree of efficiency and practical application.

It is important that we consider the effect of establishing these schools on the support for higher agricultural education. The average citizen values practical education more highly than theoretical education and the results of applied science more highly than the science itself. Many institutions of higher learning are to-day struggling for sufficient funds with which to carry on their work in higher education, and few are abundantly supplied. If the establishment of a severely practical agricultural school in every ten or fifteen counties will operate to lessen the support to the land-grant colleges by bringing the agricultural school to the foreground and discounting the worth of agricultural science and general education, this move will not be an unqualified good, and land-grant colleges will generally oppose the system, throwing the burden of extending secondary education onto other shoulders and endeavoring to aid only by furnishing the teachers who are qualified to fill these technical positions, since it must be granted that the lack of qualified teachers is one of the great handicaps to the rapid extension of secondary agricultural education.

It would seem that the land-grant college can not do less than to provide for one thoroughly equipped secondary agricultural school under its own supervision which will furnish systematic instruction to those who apply for it. This school will afford the opportunity for a study of the best agricultural practice and of home economics to those who have neither the time nor the previous training to acquire a university education. The college should make a clear distinction between higher and secondary instruction, and in its secondary school should arrange its courses to fit the student who desired to return to the land, rather than make this school primarily a preparatory school for entering the college or university. A few who are specially fitted to continue their studies will enter the college courses, but the majority will go back to the farm to make an educated constituency on the land, which is, after all, the purpose for which the agricultural college was established.

There exists to-day a great reservoir of agricultural knowledge awaiting distribution through agencies which will reach the agricultural masses. No one agency will be sufficient. The college of agriculture must furnish the leadership for this movement. The secondary agricultural school must be organized to reach the young men and women in the open country before they have turned

their faces cityward. The extension movement must reach the farmer and prove the efficiency of agricultural science to multiply the fruits of toil. In this leadership the land-grant college must not wait for the people to demand progress and improvement, but it must be bold and progressive and must blaze the trail. So shall we establish the vital union between agricultural education and rural progress.

E. DAVENPORT. In my experience and observation no single question comes quite so close to agricultural-college people right now as this matter of secondary education. To be sure, there is a demand on the part of the public that agriculture shall be taught in the schools, and there is a feeling on the part of all of us that it ought to be. We all have come to the conclusion that agriculture can be taught in schools of secondary grade. When I was a student in the Michigan Agricultural College, that abstruse and philosophic subject known as psychology was reserved to the last six weeks of the course. Now we are talking about putting it into the high schools, and I am not certain but it belongs to the grades. As Professor Burnett says, we have learned at last that the student does not require preparation in all-around science and literature before beginning the study of our subject, and I believe it is considered good pedagogy in these days to begin at once the study of any subject which attracts the attention of the student. Now, the most aggressive element in this whole matter, as I see it, is not the farmer nor the agricultural-college man, but it is the school-teacher, and he puts up to you the question, "Can we teach agriculture in our schools?" We must tell him yes or no—one of the two. We must say to him, "Yes, sir; you can, if you put money and brains into it;" or else tell him "You can not do it successfully; we must keep it out of the schools and we must have another set of schools for that work." Right there we are at the turning point of the whole situation. The reason for it is that the high schools are scared nigh unto death. They are scared for several reasons. One is that the boys are leaving them. For ten years the high-school principals and superintendents have been wondering how to keep the boys in school, for as technical schools have appeared in different parts of the State they have attracted the country boys. They know they can not keep the boys unless they put in vocational studies, and they are afraid of the technical schools coming up by the side of them. Now, unless the American high school does put in not only agriculture, but other technical and vocational courses, and unless the American high school at once is ready and willing to devote at least a fourth of its time to vocational purposes, not simply industrial, but vocational in general, then the American high school is doomed, because the American youth is bent upon technical vocational training. He is going to have it, and his father wants him to get it and it is in the air. In other words, the high schools of the United States to-day are at the turning point, and they must retire from the old position of the academy whose business it was to prepare for the literary college. They are ready to do the new thing, and we must help them. I have in mind now a high school with a thousand students and seventy-five teachers. The principal put to me this question: "Shall we put agriculture into the high school or not?" I said, "Well, suppose you do not put it in, then what are you going to do?" He said, "That is just the point; there is no can't about it; we have got to do it, and, as I see it, each high school has to put in a department of agriculture." That same high school is to-day a bigger institution in every sense of the term than was the University of Illinois fifteen years ago. I have in mind a little high school situated in a little country community. That agricultural high school undertook to prepare for our colleges and universities, but it gave four years to agriculture, and the high-school visitor says that no better science was taught in any high school in the State of Illinois than was taught in that school. The experience of Minnesota last winter is significant. They fought out this question up there, and passed a bill providing that the first ten

[Bull. 228]

high schools of the State which would introduce agricultural departments that would meet the requirements of the state board of agriculture should have a bonus from the State of \$25,000. When the bill passed 65 of the leading high schools of Minnesota applied for its benefits. Of course only 10 could be admitted, but many of the others arranged at once to attempt the work, with the hope, of course, to get in on the next bill.

Now, this means putting agriculture into the existing high schools. It means a new department in these schools, and that is all. What we mean is to put agriculture into the high school nearest to the boy, so that he can go there in the morning and come back at night. That is our job, to get secondary agriculture within walking or driving distance of the boy when he is 12 years old; and most boys get their trend in life before they are 17. We can not take them too young to make good farmers, and it will not do to let the city high schools have the management of these boys until they have passed high-school age and then put them into some school a long distance from home.

If we had not had the advantage of fifty years' experience the problem might be different. If the attitude of the educators of the country to-day toward agriculture were what it was fifty years ago, we might be obliged to establish separate agricultural schools in order to convince them. That is what we had to do with the colleges of agriculture. Michigan Agricultural College was a pioneer, laughed at by everybody. It had the job of making agriculture respectable and respected. If the attitude of the universities of America had been toward agriculture in the forties and fifties what it is to-day, we would have never needed a separate system of agricultural colleges, and we should all have been further ahead. That is simply a matter of opinion, but I believe agriculture to-day would have been many years ahead of what it is now, and so would educational standards generally, if we had made the same kind of a hitch-up in 1850 and 1860 that we can now make and are making between agriculture and all other subjects of instruction.

With that experience behind us, with the attitude of educators what it is to-day, practically confessing, and not only confessing, but tumbling over each other to show that all education must be partly vocational—I say, with that attitude of educational men to-day it is simply folly to talk about going outside of present organized systems of education to get results. All that is necessary is to do a little organizing and a little hard work, provide teachers, and then leave it to the high schools themselves. To provide teachers is the great work of the agricultural colleges. I tell you to-day the move is back upon the agricultural college. If we will do our part and do it promptly and effectively, the high schools of the country will do theirs. They ask: "Can you furnish teachers and tell us how to do it?" Now, that in general is the sentiment of secondary school-teachers in the country. There are, of course, some exceptions. We have to tell them one of two things. We can say, "You can do this," or else "You can not do it; it is too much for you." I do not want to say to the high schools, "It is too much for you." I propose to say, "You can do it if you will." If the high schools do not meet this question inside of five years, they will find themselves reduced to girls' schools in the cities and to schools preparatory to college.

HOW CAN AGRICULTURAL COLLEGES BEST SERVE FARMERS IN SOLVING RURAL PROBLEMS?

E. J. Wickson, of California, presented the following paper on this subject:

Obviously the best and most fundamental service which the colleges of agriculture can render consists in learning the character and solution of the real rural problems and in teaching what they are and how to solve them.

[Bull. 228]

As the executive committee in assigning this subject to me did not accompany it with limiting specifications, I might easily seize the chance to indulge in definitions, analyses, and arguments about rural problems and their treatment, or I might select a few rural problems and knock them out "while you wait" and thus afford a demonstration of method. Careful study of the subject as stated for me by the committee convinces me, however, that it is not intended that I should attack rural problems nor make any suggestions as to the relative efficiencies of their various solvents, and this reflects credit both upon the wisdom of the committee and upon my own insight into their intentions, because no one yet needs to be reminded that the Country Life Commission has a stock of rural problems and solutions duly arranged in order of magnitude and all connected backward with their contributory causes. I have heard only one objection to the commission's collection of causes and effects and that is that they are not new. The triviality of that objection becomes perfectly clear when one thinks of the objections which would have been set up *per contra* if the commission had brought forward a lot of problems and remedies which no one had ever heard of and therefore knew nothing about.

What can I say, then, of our agricultural problems? Evidently I am moved beyond speech and can only shout, in paraphrase of the eloquence of the old Bay State patriot: "Mr. Chairman, there stand our agricultural problems; look at them."

And having been excluded from the enjoyment of discussing rural problems as such, the question assigned to me seems to present another limitation, for it apparently contemplates only service to farmers in solving rural problems. We have become quite accustomed to the idea that solving such problems was at least a patriotic national service, and possibly even a world-wide service. If I am not mistaken, very much of our recent remarkable progress in agricultural science which has elevated farm practice, and in agricultural economics which have exalted farm enterprise, and in public esteem which has modified the attitude of all those engaged in other callings toward farm industry, has been due to the recognition of the advancement of food production as not alone a problem for farmers but for humanity. I am therefore disposed to contend that our agricultural colleges should not be satisfied with a limitation of their scope and purposes, which is unintentionally, doubtless, implied in the phrase "serve the farmers in solving rural problems."

I am not forgetful of the apothegm of the fact "who would be free, themselves must strike the blow," and I trust that principle will be used to the fullness of its hortatory force, but we all know, of course, that if no blows had fallen during the last quarter of a century except those which farmers themselves have struck, agriculture would not occupy the advanced position in the understanding of its own materials and methods, and in the public mind as a progressive industry, which is now freely accorded to it. Therefore I am disposed to claim that as agriculture is unquestionably entitled to all the recognition and all the promotion it can secure from statesmen, and from those engaged in professional and in all industrial activities, educational effort toward the solution of rural problems should never for one moment be restricted to or measured by "service to farmers," and the question then becomes simply: "How can the agricultural colleges best serve in solving rural problems?"

Having thus expanded my subject without consent of the committee, it is only fair to the committee that I contract the discussion of it correspondingly, and to this end I indulge in a category:

First. It is the duty of the colleges to undertake research to disclose data for the better understanding of rural problems and to teach all sound learning connected therewith.

Second. As true solutions of these problems affect all interests of mankind and underlie all successes therein, it is essential that they be treated not alone as class affairs but with due understanding of their relations to the prosperity and happiness of all classes.

Third. It is therefore desirable that separate colleges of agriculture should make effort to broaden their instruction in such subjects as economics and social science to the end that their pupils shall have presented to them not only "agricultural economics," so called, but should be given fully and fairly the points of view of commerce, manufacture, transportation, etc., so far as possible.

Fourth. It is also desirable that all colleges of agriculture which are integral parts of universities presenting economics and social sciences in other departments should insist that these departments qualify themselves for research and

instruction which shall embody the agricultural point of view, and do this work not alone for the edification of agricultural pupils who elect their courses, but because it is intrinsically valuable culturally, and because it is important that all citizens should be aware of the nature of an agricultural point of view and its importance in the settlement of economic problems, which has been thus far chiefly approached from the points of view of commerce, manufacturing, transportation, etc.

Fifth. As it will be, perhaps, conceded that research and instruction in the sciences and arts of production have brought the farming interests to a producing ability greater than their ability to move and market products profitably, it should be the duty of the colleges to manifest serious appreciation and earnest activity in solving problems of the latter class and to plan for new and broad effort in that direction.

We return, then, to the starting point—that the most fundamental services which our institutions can render is to understand rural problems and teach what they know. Two questions arise—how to provide for research and how to conduct instruction. Both are difficult to answer. The second question is particularly difficult, because the subjects are not only obscure and complex and hard to differentiate from the forbidden and closely allied subject called “politics,” about which every citizen considers himself the best, as he actually is the ultimate, authority in the choice of his own opinions and actions. In advancing agriculture the teacher of agriculture has to demonstrate the superiority of his knowledge to that of the old practical farmer who operated by tradition and moonlight as recorded in the “farmer’s almanac,” and so the teacher of economics from an agricultural point of view must demonstrate to all fair-minded people that he knows more than the visionary who honestly “has opinions as hold to reason,” and vastly more also than the demagogue who cares neither for honesty nor reason. Still the undertaking must be made both in regular college courses and in extension work. It will require masterful and ready men and should not be entered upon without them, at least on the extension line, where “talking back” is generally invited.

To provide for the research which will enlighten rural problems will chiefly require funds. There are many higher-degree men now issuing from our universities who have had thorough training in the methods of inquiry and demonstration in economics, and many of them have had experience in rural life which will enable them to appreciate the nature and importance of the work which is needed from them. The best of them will become the teachers who are required. It seems desirable, then, that the problem should be first attacked upon the research side, and whence shall the funds be derived?

I hesitate to make a suggestion which I have in mind, because it is against all the traditions and may possibly be capable of sharp denial. Still I am impelled to proceed upon the strong conviction that the truth which our agriculture now most urgently needs is not to be gained by extending investigations in the physical sciences nor in the application of the results to agricultural practice, though both are desirable. In my own State they are being increasingly provided for by state appropriations. Such researches as are now needed in rural economics and social phenomena are not likely to be provided for by the State, and they are properly a national provision.

Are the Hatch and Adams funds available for such researches? They would meet the requirements of section 1 of the Hatch Act, for they would yield “useful and practical information on subjects connected with agriculture,” but section 2 of the Hatch Act undertakes so many specifications along lines of physical science and agricultural practice that the inclusive phrase “and such other researches and experiments bearing on the agricultural industry” must be taken perhaps to mean something else of the same kind. Although the Adams fund is declared to be for the more complete endowment and maintenance of stations now established under the Hatch Act, its provision for “original researches or experiments bearing directly on the agricultural industry” is not connected with physical phenomena so closely, and, for all I know, may be employed for economic and social researches “bearing directly on the agricultural industry.”

However this may be, it is clear that the answer to the question submitted to me is that the agricultural colleges can best serve in solving rural problems by undertaking such researches and by maintaining in all lines of teaching, in the college classroom, in extension efforts, and by publications, the truths which such researches shall disclose.

J. H. WORST, of North Dakota. I can see that, perhaps, if the section had taken different action on the subject of college extension, there might be an opportunity here to say considerable that would be of interest. But the action which the section has taken renders it unnecessary. To my mind the college that is earnestly endeavoring to meet the needs of the community will find a means through that channel of serving the farmers of the open country. Now, being a hereditary farmer myself, it looks to me a good deal as if in all these sessions we are undermining the old-time farmer—the hereditary farmer. But we may say what we please, for him or against him, he has been in existence a long time, and he has made a splendid record. He has fed the world and furnished raw factory material since man inhabited this planet. He has got his traditions, his peculiarities, his notions, and we are simply destroying all these and building up a different sort of farmer. I do not know but we can make a good deal better one, a more scientific one, and I think the world needs it.

I can not quite agree with Professor Carpenter in his magnificent optimism, that as these great problems come up we are going to be sufficiently ingenious to meet them and cope with them successfully.

I like optimism, but it seems to me that the time has come when our agricultural colleges and all the influences that can go out from these directors and teachers should be on the side of conservation and economy. One of the great problems which this old-time farmer is confronted with to-day is, What shall he do with his boys and girls? He does not like to send them away to school because he knows, or he has observed in the past, that it takes them away from the land. I remember years ago traveling teachers used to tell us if we were bright boys and attended strictly to our work, we would not have to be farmers. We look upon agriculture now as quite a different thing from what it was twenty-five or thirty years ago, and it is destined to become the great profession of the future; there is no question about that. Now, we must learn to know the farmer; we must learn to know his traditions, his notions, his weaknesses and failings, and teach him in some way, by college extension work or in every other way, to live a better life in the open country. I do not see why we can not take up the subject of showing him even how to enjoy the conveniences that are now supposed to be enjoyed only in the village and in the city. We have many ingenious contrivances by which we can help the farmer by models and plans and other influences so that he can surround himself and his family with modern conveniences. We can help him in planning the location of his buildings, in providing drainage, sanitation, and toilet facilities, and by means of power, either wind power or by the use of the gasoline machine, to enjoy practically every convenience on the farm that is now enjoyed in the village or city, so that the money that is made on the farm can be used to beautify the farm and make farm life more agreeable. I think when that can be done, that is, when we can satisfy a large percentage of our population that in the country is a good place to live, we can help to improve rural social conditions; in fact, change this old-time farmer to a new one by improving his view point of life and of the social conditions with which he can surround himself. I think we will have very little difficulty then in inducing our boys and girls to look to the open country as a very suitable place to live, and the country will be better for it.

A. B. Cordley, of Oregon, presented the following paper on the same subject:

At the beginning of the second half century since the establishment of the first American agricultural college we are coming to grasp the full significance of the movement for which they stand—the betterment of all that pertains to rural life. We now realize as never before that the rural problem is a problem of better living, as well as of better farming, and that the function of

these colleges is to give impetus and direction and aid in the solution not only of the last-mentioned part of the problem, but in the certainly no less important first-mentioned part.

I believe the best way in which an agricultural college can fulfill its complete function is to carefully study its undergraduate and graduate work, adapting it to local conditions and broadening and strengthening it wherever and whenever possible, to the end that its graduates may be efficiently trained not only in technical agriculture, but that they may also have an adequate conception of the political and social problems of the open country. If the leaders of the new rural civilization are to be trained anywhere, and it goes without saying that if they are to be safe and efficient they must be trained, this training must be obtained at the agricultural colleges.

This phase of the college function, however, has been ably discussed. The addresses of Presidents Butterfield, Snyder, and Storms, and of Deans Bailey and Davenport, and others, while they may not have exhausted the subject, have certainly exhausted my capacity to add anything of value.

I am convinced, however, that before the agricultural colleges can wield any great amount of influence—either directly or through their graduates—in solving the social-environment problems of the farm we shall have to recognize and act upon the idea that such social, political, religious, educational, trade and transportation, and other problems offer as rich and proper field for investigation as do those which merely influence production. Competent instruction in technical agriculture became available only with the development of the research functions of the experiment stations, and I believe that such financial and other encouragement as may be necessary to develop their research functions and make them coordinate with the department of technical agriculture should and must be extended to the various departments of history, political and social science, commercial and other similar departments of these colleges. Such departments must become active research agencies before they are likely to become the most efficient teaching agencies.

The influence which the agricultural colleges are to have in redirecting the courses of study in our primary and secondary schools has also been adequately presented by Dean Wickson and others. All that seems to be left to me is to go back to the farm.

It was stated here yesterday, I think by President Bryan, that our knowledge of production far exceeds our knowledge of how to dispose of our products or how best to use that which has been received in exchange for them. The statement is no doubt true, but it does not necessarily follow that the masses of the people who live upon the farm have absorbed appreciably more of one class of information than of the other. While the agricultural colleges have been investigating and teaching better methods of farming, the grange, the farmer's club, rural free delivery, the telephone, and the trolley car have been improving the political and social condition of the farmer.

I fear that no one can travel from the Pacific to the Atlantic coast, as I did last summer, and give attention to the agricultural conditions as he finds them without arriving at the conclusion that while the researches of the stations and the teachings of the colleges have modified the practices of individuals and even of restricted communities, they have not greatly changed those of the farming masses.

If the prices for the necessities of life, in the face of a rapidly increasing population, are to remain such that the American standard of living can be maintained, it is absolutely essential that a system or systems of farming be generally adopted which will not only yield a profit to the farmer but which will also maintain or increase the fertility of the soil. That this can be done is shown by the constantly increasing yields of European farms; that it is not done here is equally well shown by the constantly diminishing average yield of our own acres.

Nevertheless, it can not be expected that better methods will prevail until it can be demonstrated that they are profitable to the individual who adopts them. The farmer can scarcely afford to be a philanthropist. Therefore, any reasonable expenditures by the State or National Government which will tend to hasten the adoption of such methods should be considered as a wise, even a necessary, investment.

The agricultural experiment stations and the Department of Agriculture have accumulated a vast store of facts regarding agricultural science and practice. Through the medium of bulletins, the agricultural press, farmers' institutes, winter short courses, demonstration trains, movable schools of agriculture,

correspondence courses, cooperative demonstrations, experimenters' leagues, etc., effort is being made to bring these facts to the knowledge of the farmer. And of course much has been done toward laying the foundation for a higher standard of farming. It seems, however, to be unquestioned that what is needed most at the present time is to devise still better methods of bringing the knowledge which has already been obtained to the attention of the farmer, and in bringing about on his part desirable modifications in his farm practice. I believe every agricultural college should maintain a well-organized extension department which should aid the farmer and the farmer's wife by any or all of the above methods, as circumstances may permit. But I also believe that we should recognize the fact that these methods all unite in having three serious faults: (1) The teaching is sporadic and the series of facts which are presented are more or less isolated; (2) they reach, principally, the reading, thinking farmers—the class that least needs aid; and (3) they do not demonstrate the practicability of the methods taught. What is further needed, it seems to me, is some method of bringing together the facts of agricultural science, welding them together into a rational system or systems of farm practice and actually demonstrating their practicability and adaptability to local conditions. All of this can be done, I believe, by a system of well-conducted demonstration farms.

If such farms are to fulfill their mission they must be purely demonstration farms and not for experimentation, and they must be more than self-supporting. They should even be more profitable than the systems or lack of system generally in vogue in their respective localities, while at the same time the question of profit must be secondary to that of increasing the fertility of the soil. If the system adopted on any such farm is not profitable, the demonstration is valueless to the farmers; if it fails to increase the soil fertility, it is valueless to the State. Doing both, it becomes of great value both to the farmer and to the State.

OFFICERS OF THE SECTION.

E. A. Bryan, on behalf of the committee on nominations, presented a report recommending the election of the following officers: President, S. Avery, of Nebraska; secretary, W. D. Gibbs, of New Hampshire; members of the executive committee, W. O. Thompson, of Ohio, J. L. Snyder, of Michigan, and W. E. Stone, of Indiana.

On motion, duly seconded, the secretary was instructed to cast the ballot of the section for the candidates named, which was done, and the respective candidates were declared elected.

WORK OF THE COUNTRY LIFE COMMISSION.

J. A. MacLean, of Idaho, offered a resolution on this subject, which was referred to the general session of the association with approval of the section, and adopted, as already given on page 44.

The section thereupon adjourned sine die.

[Bull. 228]

SECTION ON EXPERIMENT STATION WORK.

AFTERNOON SESSION, WEDNESDAY, AUGUST 18, 1909.

The meeting was called to order at 2 p. m. by P. H. Rolfs, of Florida, chairman.

RELATION OF THE DIRECTOR TO THE MEMBERS OF THE STATION STAFF.

E. Davenport, of Illinois, read the following paper:

The relations that shall exist between the director and the members of the staff will depend upon the particular theory of administration adopted for station purposes.

Now, there are three well-defined and distinctly different methods of organizing a body of men to do an effective piece of work. The one that is likely to be employed will depend upon the nature of the work to be undertaken, the numbers and character of the men involved, and the temperament of individuals—indeed, every case of organization involves the whole philosophy of administration. It will facilitate discussion if each of these three theories of organization be briefly outlined.

(1) In the first the director is conceived not only as the highest officer, but as the source of all authority for the station worker, subject only to the governing board.

This is the form of organization best adapted for military purposes, where all results are mass effects and where individual initiative is not necessary or, indeed, altogether desirable. Applied to business or to education it assures what is known as a "strong administration." Such an administration commands peace and prompt service, at least while the authority lasts, but in my judgment it is not the form of organization that is productive of best results in the field of either instruction or of research. Its fatal defect lies in its assumption that all authority is delegated from the administrative head, a defect that not only frees the individual from responsibility, but, what is worse, kills that personal initiative which is the heart and soul of all good work, either instructional or investigational.

In a modified form, with its corners rubbed off, it does well as a form of department organization where most of the employees are of the grade of assistant. In the same denatured form it may do, too, for a small station in which the director is the chief investigator and all others are virtually his assistants, though this undertaking is likely to involve dangerous confusion as between administration and research, a condition likely to make trouble as the station grows and begins to break up into subunits.

Another defect in this system is that the activities of the organization are limited to the capacity of a single individual, and still another is that the best scientists object to subordinating their work to the exigencies of administration. They feel that the administration of a research body is not subject to the onerous limitations of the military, in which all work is team work, and in which results depend upon instant and coordinated action in the pursuit of a definite plan involving previously arranged details.

(2) A second system of organization is the exact opposite of the former. It is distinctly democratic in that it regards the body as composed of peers, and the director as nothing more nor less than a presiding officer, but with no authority whatever over the deliberations of the staff or even their enforcement. This is the form of organization recommended in some quarters for the American university, a form of administration best adapted, I think, to a family of kittens or a nest of bull pups.

Such a proposition virtually proposes to do away with administration altogether. Its defect is that there is no way of regulating affairs, of coordinating

work, of expediting business, or of knowing who is faithfully attending to business and who is not. This defect unfits it for all kinds of public service, because the only way in which a body of men can be held accountable for results is by a system in which one is responsible for many, a responsibility that lays upon him the duty to report, and which in turn must give him the right to require an official accounting. That such a system of organization and administration should be seriously proposed for American universities is almost beyond belief, except that all things are possible.

(3) The third form of organization aims to secure the business facility of the first, and, upon occasion, its administrative strength as well; but it also aims to preserve the comfort and secure the personal initiative of the staff worker by refraining from parading the administrative trumpet and banners. It aims to secure in advance, by frequent and free discussion and by conference, the best judgment of which the staff is capable, and then to see to it that plans are carried out, assuming that every individual is loyal, and understanding that the best scientific service, like the highest loyalty, can never be commanded.

It is a cardinal principle in this method of organization that administration exists for the sake of and to facilitate work, and that work is never to be the servant of administration; that the two are to be kept distinct; that the worker derives his authority not indirectly by delegation from his administrative superior, but directly and arising from and out of the nature of the service he undertakes to render. With this form of organization, administration never exerts its superiority except in emergency, when it does not hesitate to perform any act necessary to the preservation of integrity or the correlation of work. In its day-by-day operations there is little evidence of organization, and none of authority, and it may easily be taken by the casual observer for entire absence of system; indeed, it is more in making plans than in their execution that the organization is used, the theory being that execution is an individual matter, while planning is or ought to be the result of the most carefully organized consideration. It is only occasionally and upon emergency that such an organization is obliged to exert authority to secure results or to employ its power to exact service.

This is the form of organization in which the writer believes and which he tries to maintain. I am perfectly aware that it may appear to the onlooker as a free-for-all race without much organization. All parties, however, are advised not to fool with that kind of a machine, even in its most innocent moments, for if properly put together and reasonably well adjusted and oiled it is ready to go off at any time, and it is the more dangerous because every member of the organization knows the combination and how to work it.

Of course I am writing out of my own experience. It is the best I can do. We try to separate the office and the man. This gives rise to two important distinctions. The first is that the same man may hold two or more offices, a fact that sometimes makes A superior to B and at others reverses the conditions, or even compels a man upon occasion to act as his own subordinate. The other fact is that the same office may be held and its duties discharged by more than one man. For example, in my absence another takes the office and performs the functions of director, in his absence another, and so on indefinitely in regular order. I never leave my office in the hands of a clerk, for I would not permit the head of a department or any other member of a staff to take rulings or decisions from other than an administrative officer. Every day certain matters must be decided and put at rest once for all. It really matters little who decides them, and often but little as to how they are decided. The important points are that they be decided by some one who is a peer of any other one on the ground. The other important consideration is that once decided the matter must be ended, and I would no more review or reverse the decision of a temporary occupant of the office than I would offer him personal insult, and whether I would have made the same decision or not I should accept his ruling while in my office as final. This much of the military method I most heartily indorse and believe in.

In the practical operation of this plan nearly everybody in the station has had experience in discharging the duties of his superior, for the same method is extended into the departments, and every interest is always at home and ready for business. At one time last year twelve of the principal officers of our station were away at one time, but affairs proceeded precisely as if every man were filling the office to which he was elected.

The best proof of a system is its working, and I am glad to say that during the dozen years of the operation of this policy there has been no single case of

reversal of the acts of another, and only one case of neglect to scrupulously respect and observe the rulings and acts of the temporary head—in this case, not the director, but the head of a department. That member of the staff got his lesson at once and will, I think, never need it repeated.

I can now very quickly give my conception of the relation between the director and the members of the staff. First of all, the director is an officer, not an individual. As a policeman is an officer only when he wears his star, and as a member of the board of trustees is an officer of the station only when the board is sitting in a body, so the director is director only when acting in that particular official capacity. At other times he is the station worker like other members of the staff, and the less he parades his uniform the better, lest he appear to profit by administrative advantage.

All our difficulties arise by reason of confusion as to rights and duties, and most of us are too prone to forget that we as individuals serve in a variety of capacities. We are too conscious of the most influential office in our possession and carry ourselves always as if in the discharge of the functions of that particular highest office.

In its strictest sense the director as an officer has the right to expect the fullest devotion and the freest service to the station from every member of the staff, and if not cheerfully accorded his obligations of higher authority give him the right and make it his duty to exact it and to take any measures necessary to secure results.

As an individual he is, or ought to be, all things considered, a peer of his fellows, nothing more, and hopefully nothing less. If he is a good director he will have associates that are his superior in the lines for which they were employed, and his duty is to make it possible for them to render their service in comfort and without pestiferous interference from anybody, just as he has the right to expect that all the power and personal influence of every member of the staff will always, and at all times, be exerted to the preservation of the integrity of the station and the protection of the work and the rights of every member of its staff.

I have tried to draw two fundamental distinctions, one between the office and the man that holds it, the other between administration and work. The station exists for the work it can accomplish and for no other reason; hence, under all ordinary conditions, administration is subordinate and not superior to work, and it is only when the integrity of the organization is at stake or when some one proves untrue to his post that administration becomes superior—this is upon the principle that to preserve existence is the first law of all things. All good work is the result of intense individual effort, and it should therefore be the first purpose of the director, like all other administrative officers, to bring the individual and work into the closest possible relations. When we do this, and when we remember the distinction between the office and the man, then is the ground prepared for the closest and the sweetest of human relations between the director and the members of his staff, relations that soon permeate the body and ultimately come to characterize the body as a whole and that go far to temper adversity and disappointment and to blunt the sting of occasional administrative exigency. That these relations may be close and sympathetic, I do not believe that the worker should be freed from all administrative responsibility. He is the better if he wears the harness a little and learns to take the rubbing. Neither do I believe that the director's time should all be concerned with executive work. He is the better administrator and the more sympathetic adviser if he himself also from day to day functions somewhat as a station worker. When he does this let him lay off the harness for the moment that the galls may dry off and heal over. This is my best counsel to the young director, except that the administrative harness should always be lightly worn, for it is only occasionally that the director needs to rise in his stirrups and flay his enemies, and when this time comes the best of all help is the loyal support of his staff who believe in him as a human being because his treatment has been broad and sympathetic, not that of a powerful administrative officer exacting the utmost of his advantage.

This paper would be incomplete without reference to a common and very special kind of relationship between the director and members of the staff. I refer to the young, inexperienced, and growing man who has promise of a shining future—the coming man who has not yet arrived—to distinguish him from the larger mass that will never rise above mediocrity; to distinguish him and help him to develop—this is the highest of all the many functions of a director.

A. D. Selby, of Ohio, presented the following paper on the same subject:

The writer has been interested to study the matter as presented by Director Davenport and cordially supports the views held as to the proper method of station organization.

It is not questioned that possible administrative strength is a necessary and vital consideration in the handling of so great a business enterprise as is found actually existing in the experiment station with which I am most familiar. Any other point of view would almost surely prove hazardous and likely fall short of satisfactory achievement in investigation because of the very great danger that loose methods of administration would in turn react to produce lax methods of investigation. The experiment station to serve its real purpose and to provide for continued agricultural progress may not foster laxity of methods in study nor indefiniteness of aim in its researches. It may further be assumed that we are all essentially agreed upon the ultimate aims of the experiment station work in one's charge and the various administrative necessities imposed. Even with this agreement it may or may not follow that station work is not to be made and not infrequently will be made the servant of administration. While granting the correctness of this cardinal principle that work should never be made such a servant, and that danger exists under such condition, the condition almost certainly arises from the source of support of the average experiment station, and from the extremely diverse character of the work conducted by different members of the station staff as well as from the equally varied exactions imposed by the preparation of the investigator himself. This statement is not with any thought of its being an original or even a late-day observation. The writer has been engaged for fifteen years, consecutively, in essentially a single line of service at the Ohio station, and all of this service has been under the same person as director of the station. While this continuity of service with respect both to director and staff member may not make for breadth of personal experience with different individuals, it offers an excellent opportunity to realize more completely the discoveries demanded of the station investigators and the probable means of their attainment. Such continuity offers fairly acceptable evidence as to the mutually satisfactory nature of the relations existing between the director of the station and the particular staff member. I wish to bear further my personal testimony to the same mutually satisfactory relations. It is well to add, moreover, at this time, that as station botanist very largely engaged in plant disease investigations, the writer has not been pursuing a line of research that, in its subject-matter or its nature, per se, may be sufficiently familiar or within the daily range of practical experience to such an extent as to appeal very powerfully to the average farmer. I take it, further, that in this respect the mysteries of plant life and of the activities of plant protoplasm tend rather to a natural repression of interest in plant pathology as compared with the expression given to interest in the problems of the apparently inanimate soil, which all have learned in rural practice "to turn with their plowshare and tread upon."

Not alone from our individual conceptions of the proper theory or method of station administration and the mutual individualities of the director and staff member will be derived the final determining factors in this matter. Whether or not we may realize it in looking at these relations, the line of investigation will in itself have much to do in shaping the final status of these relations.

The support of most experiment stations is derived from at least two distinct sources, namely, appropriations from the National Government and appropriations from the State. With some stations fees from inspection or control work are to be considered. The source of support is a factor of great weight in determining many of the relations of the investigator.

No staff member of long experience has always had from year to year the same satisfactory experience in departmental support. The causes need not be recounted but the facts are as they have been with each of us. The facts as to relative funds may vary considerably as between stations connected with agricultural colleges and those independent of such connection, as we are in Ohio. The discussion has to do more directly with our own conditions. The separation or essential separation of administration and investigation, as stated by Director Davenport, demands as a corollary that the administration of the station shall at all times be able to place at the disposal of each staff member an amount of funds which shall leave him relatively free to pursue his investigations. In case the station is not able to provide this requisite sum, will the administration expect the staff member to subordinate his inves-

tigations, for which he may have been some years in preparing by preliminary work of various kinds, to the exigencies of station support, or is he to spend time and energy in securing for himself by quasi administrative duties the fund so necessary for his real work? I can see no escape from one or the other of these alternatives. While cases of the kind stated may be called special or unusual ones, the type of case is very common. It is even more than probable that conditions of this type are the most usual basis for strained relations between the director of the station and the members of his staff. From the very nature of the pursuits of the station investigator, the limits of adaptation for this work to state-wide variations in income or interest are relatively narrow—men so engaged get ready but once for a given line of work. A hiatus results if the work then fails. Herein may arise the issues which result in much loss of effort through changes of men from one station to another. While the cases are individual the basal scientific investigations are vital to agricultural progress.

I believe that few men of experience in either station administration or investigation will deny the very obvious risk involved in the interrelations between the views held by the agricultural public as to what is needed at any given time and the possible support obtainable by the director for the station's work. That it is easier to yield to pressure from without than to organize and direct it is also possible. From the character of station organization the vital thing to the staff member is timeliness and continuity of departmental support. Out of its failure from any cause may easily grow strained relations.

Further, it is more than possible that the fidelity of the station director and his staff members to the high ideals of the station's mission in directing agricultural development rather than in simply moving with it, may decide, in the course of time, whether these institutions are to exist as virile centers of investigation or fall much below that ideal. Any effort at the development of the results of the drifting policies seems scarcely in place. I presume it is even probable that like temperaments segregate at a given institution. The feature is mentioned to bring out as clearly and as concisely as may be, some matters the staff member must receive at the hands of his director or fail in his own lines.

The first is adequate financial and moral support.

Another consists of an appreciation and sustained interest in the work the officer is planning or pursuing; while yet others proceed from the more individual circumstances which may exist.

The reactionary influence of any failure of the director to support and show reasonable interest in the work of the staff member will soon be apparent in most departments of any station. The director's interest if shown in certain directions will inevitably result in corresponding development in such lines. Since so much will proceed from the mental attitude of the director, his training will profoundly influence his relations to the members of his staff.

There may be greater disadvantage than advantage in having an investigator within a restricted field to serve also as director; as a corollary, so to speak, the director must be looked to for certain standards of station service. He must have some just conception of the nature and of the difficulties surrounding each of the many lines of station work or some of this work will surely languish.

Without emphasizing unduly these interrelations of director and staff member, which I have been at some pains to present, I wish to consider some of these things which have to do with the standards of research. We do not need to parade the excellencies of scientific research to realize these ideals of effectiveness. The exactions of investigations in science are fairly well appreciated. Few lines of station work consist of purely scientific investigations. Experiment station work is typically the study of practice in applying science to agricultural production, including animal husbandry. Applied science must possess that dual nature which it at all times shows. It consists of its rigorously proved facts and the more or less tentative results of their application to living organisms.

Accordingly as a man's training has been of the exact type or has been supplied by data of more practical character, his standards and his ideals will be molded. Have not American experiment stations suffered from inadequate ideals? If we answer "no" to this question we are then forced to ask, Has pressure from the agricultural world been the source of direction?

Any analysis will lead to the recognition of many determining forces. Yet the writer believes that the chief ones are covered by the statement previously made of the relations existing between the sources of station funds and the

demands for certain work. There is some analogy between the experiment station situation and the flow of water in an open channel. "The stream can not rise higher than its source" we have long been advised. Has the station been able to rise higher than its source of motive power? There is at least inadequate evidence that it has done so.

I may illustrate even better the effects of these groups of influences by following the course of development taken by plant pathology in America.

In the beginning, we had available the laboratory literature of our diligent German friends in which the fungi of plant diseases were given satisfactory treatment. In these the mycological side of the science had been well developed. At the same time the outdoor or host aspect of the subject had been inadequately investigated. The matter of therapeutic or treatment measures for diseases had been imperfectly considered except as Millardet in France had brought out the basic facts concerning Bordeaux mixture and was followed by Jensen in his hot-water treatments for grain smuts.

The course of plant pathology has continued along its previous lines in Europe. While there has been discovery and improvement in methods, the literature of the subject from the European standpoint continues to be purely or almost purely mycological.

In America we have been even more diligently engaged in pathological work than the Europeans and we have been content to use the European texts for instruction since they are all that have been available. Yet despite these sources of instruction the work of plant pathology with us has been very largely from the standpoint of the host and crop. The development of methods of control and the success of the methods employed in the treatment and prevention of plant diseases in America have gone far beyond anything that has been produced elsewhere. As was remarked last winter by a well-known Eastern plant pathologist, "America is so far ahead of Europe, including the Germans who may be said to have originated the science of plant pathology, in the application of treatment methods that the subject has become almost a new line of work." In view of these facts we may properly ask what influences have brought about this result and along with them what influences have resulted in the rather indifferent laboratory development of the study of parasites in America. It seems to me that the influences have come from the fact that our institutions, including experiment stations, have been able to obtain support for the work in disease prevention, and on the other hand, it has been difficult to get adequate funds for the narrower and more strictly scientific study of the laboratory. We see the results of this necessity by one-sided development upon every hand and we have reached the point where without the development of the laboratory side of the subject progress will be restricted. I believe the same state of facts applies in a number of lines of experiment station work. I am firmly convinced that the staff members must in the future receive a more liberal support in this line from the administrative officers of the station or the progress will be very slow. Does the station director feel keenly enough, as a rule, this necessity? Whether or not he does it is very plain to the writer that the members of the staff in charge of such lines of investigation have felt it for several years past. While it is granted that the Adams fund is designed to attain this end it is insufficient in large stations. I wish to make appeal for the hearty support of station directors along these lines.

H. J. WHEELER, of Rhode Island. At the Rhode Island station several years ago the station council, consisting of the heads of the departments, the first assistants, and the director of the station, apportioned the funds to the different departments. That plan does not appeal to me as at all satisfactory, and I do not think it tends to promote the best of relations between the heads of the departments or between the director and heads of departments. So far as my experience goes the best system of administration (and in this I expect to be disputed) is to give the director entire charge of the funds. If he is a wise director, I think he will plan to undertake so few lines of work that he can surely furnish to every head of a department everything that he can reasonably expect as necessary to make the department a success. Under such a plan there is no complaint, for all get what they want, and at the end of the year there is usually a little money that can be distributed in the

different departments for books or special apparatus. I have been more than pleased with the system, and I believe that every man that has worked under it has been pleased. The system, in a way, is equivalent to an apportionment, since each head of a department learns in advance from the director that his plans for the year can be carried through.

H. L. RUSSELL. Under the conditions in Wisconsin I believe that it is better to have the funds largely under the control of one individual. I think, however, it is very necessary that there be a factor of safety in the way of a considerable amount to meet emergencies. With us it is customary each year to prepare an annual budget. Each department is called upon to present its needs both with reference to salaries and maintenance, and these are then gone over after they are assembled to find out whether or not they are within the limits of possibilities. Then the budget is made up by the director on the basis of these departmental estimates taken in the light of the previous years' experience, also considering, of course, the possibility of new lines of work being developed, while a factor of about 5 per cent is maintained for a reserve. Each department, if it finds that it is not sufficiently provided with funds, may come to the director during the course of the year with a statement as to needs, and is supplied from this reserve. In that way we are always on the safe side, and still the funds are divided not in the manner referred to, by parceling out to the different departments a definite amount, but by a sort of combination of departmental and director's estimates. In that way our funds, I think, are husbanded probably more satisfactorily than they would be if controlled by a committee.

J. L. HILLS. The method that Dean Russell has outlined resembles one which has been used at Vermont. At the end of the fiscal year the director, after consultation with departmental heads, has made out the budget upon the basis of the previous years' experience, leaving a 10 per cent leeway for contingencies. If, then, toward the end of the year one department of the station is tending toward an overexpenditure and another toward an underexpenditure, and one can help the other out, it is done; and the 10 per cent contingent fund is likewise drawn upon. The method on the whole works well.

H. J. WHEELER. We have accumulated at our station several thousand dollars of surplus which can be drawn upon at any time, so that if a certain department needs \$500 to get special apparatus in a certain line we can get it, or if a sudden need of assistance arises in a department it can be met.

E. DAVENPORT. It seems to me we can avoid a great many pitfalls and misunderstandings by a thorough understanding before any new department is opened. We have at our station what we call a conference of the different departments, which meets once a week, and no department undertakes any new movement, new experiment, new line of departure of any sort, without it is fully talked over in that conference. Frequently in planning experiments a good many departments possibly may be involved in the same experiment, and that in general is what I had reference to. It is not well for a director and one member of the station staff to plan an experiment by themselves alone without the other members of the staff knowing about it. I think we waste a good deal of time in our experiments by not talking matters over in advance. It seems to me there is great danger in launching undertakings without a common understanding all around of what the undertaking is to be and what the purpose is.

A DELEGATE. How far do you think the director should keep posted with the progress?

E. DAVENPORT. I think it would be better for him not to know much about the details. It is well enough for him to know that things are progressing

well, but the director who calls at the station each morning and assigns the work for the day is not a good director. It seems to me it is not well for the director to give too much attention to details, but at the beginning to give a good deal of time, a good deal of care, with the station worker, to defining experiments, their plan and purpose, and to discussing back and forth methods of procedure. Then he can very well let the work alone until results are due. In other words, we must assume that the station worker is skillful in his line. We must assume some things and trust each other a little.

It seems to me where there is an understanding of the nature of the experiment, the purpose to be achieved, and the funds at the disposal of the station for that purpose, in a general way the course of procedure ought to be talked over thoroughly between the director and the man who does the work and with all others who are interested.

H. J. WHEELER. Do you not think it is a good thing for the director to follow the details and to keep in touch with the work enough to show that he is in sympathy with it at all times?

E. DAVENPORT. If a director were able to be at half a dozen places at once he might do it.

T. F. HUNT, of Pennsylvania. Do you keep a record in the director's office which shows what progress is being made by the different station workers?

E. DAVENPORT. No, sir; we do not. It would not be possible in our station. Each department (we have five) has its own headquarters. The records are kept there and the director's office pays no further attention to the department records.

T. F. HUNT. Suppose the head of a department should die and you wanted, as director, to know the condition of that department, what means of determining the progress of the various pieces of work have you?

E. DAVENPORT. The regulations are that the records must be kept so any man can tell.

In the system followed at the Illinois station the director lets go of the funds just as soon as possible, and he does not have any 10 per cent or 5 per cent reserve. The department understands that when the money which is assigned to it is used no more is to be had. But the assignment of money is the result of conference. When the question of the appropriation for certain lines of work comes up, all heads of departments go into conference on the matter and the funds are apportioned on the basis of an agreement as to the needs of all of the departments. An agreement is reached; every man knows why the other man needs more or can get along with less. That closes the financial question for the year.

R. W. THATCHER, of Washington. What is the relation of the director to a completed project, the publication of a completed project? I have observed two attitudes upon that matter. One is that the results of the completed problems are the property, in a professional sense at least, of the investigator, and that the wording, the formulation of the data, and so on, for publication, are his own and that no one else has any right to edit it. On the other hand I have seen the theory advanced that the director is as an administrative officer responsible to the State and to his constituency for getting the information to them in the best possible manner, and that he has a moral obligation to see that the results of the completed project are published in what would be the best form in which they may reach his constituency. In other words, has the director the right to edit the results of his investigator's work?

E. DAVENPORT. That strikes at one of the chief questions in administration. I think the director has the right to edit if necessary. If I felt it was my duty

to hold up a bulletin written by a member of the staff, it would be exceedingly hard, but I would do it. It is a rare case, however, in which a director is justified in either suppressing a report of a piece of work or turning it over to somebody else to have it worked over. I have done that thing, however, and I think, in the case of an emergency, it is the province of the director to see that matter is put out in proper shape; but in all ordinary cases the work shall go out as prepared.

J. CRAIG, of New York. There seems to be two systems of organization of station and college departments, the one making for a large number of small departments with heads answerable directly to the head of the college or station, and the other making for a small number of large departments under one head, who deals with the executive, and I am wondering whether there is any unity of opinion upon these methods of organization. With regard to the department appropriations, the method outlined by Dean Russell is the one which we have found satisfactory at Cornell. In support of it I might say that it gives the head of the department an excellent opportunity of keeping in close touch with the progress of affairs.

E. DAVENPORT. In Illinois we are drifting to large departments. I do not think there was any special determination to do it in the first place. The university, however, seems to believe in the plan of fewer and larger departments. Whether that will prove the wisest in the end I do not know. It is most comfortable for the director, and it looks like the wisest way to maintain a large number of people in a complex organization.

A. C. TRUE. I think this is one of the undetermined questions, as Dean Davenport believes. I would say that at present the general idea is to have relatively few departments. I have found that quite different situations present themselves in different stations. In some stations there is no doubt that the director undertakes to make himself responsible for the station's work in an exemplary way, but I am inclined to think there are more cases where the director does not follow the work of his station closely enough. Some directors do not seem to appreciate the importance of such relations with their staffs that the latter will look upon the director as really the determining factor in the organization of the work of the station. That is brought out in connection with the Adams fund work. There have been a good many instances in which the plans for the Adams fund work were transmitted to the Office of Experiment Stations just as they were transmitted to the station director, and there was no evidence that the director had carefully considered the plans or passed upon their merits in a general way in the first place.

The director of a station is not to be considered an expert in all the different lines in which the station is operating, but that is equally true of the Office of Experiment Stations, and to submit to the Office plans of work which have not been thoroughly digested with reference to their general character and fitness is, it seems to me, simply transferring the proper business of the director over to us and asking us to do things which are not our proper business. I speak of that simply by way of illustration of general principles. It seems to me that the director of a station should follow the business of the station closely; should exercise his authority as director of the station and see that the plans of work are properly considered, properly made, and properly carried out. I think all that can be brought about much in the way in which Dean Davenport has set forth, and yet retain the confidence, support, and respect of the station staff.

H. L. RUSSELL. One of the most fruitful things we have had in our experience is the formulation of projects in a well-defined way. Our method is that

when a department wants to take up a long line of work it submits a succinct statement of the experiment, its subject, stating briefly how the experiment is to be performed, the name of the experimenter, whether the work is to be done independently, in coordination with some other departments of the station, or in cooperation with other organizations in the State, and also an estimate of the cost. This makes a definite project which comes to the executive department and is there passed upon. Now, that gives an opportunity for the director and for the department concerned to go over thoroughly and fully the details of the experiment. I think that if some such method were universally followed it would result in a large saving of money. In my experience I have seen instances where material has actually been bought, animals have been purchased for experimental purposes, and when the experiment was started it was found to be absolutely impracticable. If the thing had been worked out in advance this expenditure would not have been incurred. Therefore I believe that the working out of a well-defined project submitted in writing is of great importance. The project is generally accepted after a conference with the director, and an assignment of funds is made, and then at irregular intervals, at least once or twice a year, the department ought to make a report upon the progress of the work, so that there is in the executive office a record substantially of the whole transaction of each experiment. The experiment may last for three or four or five years, but there is a continuing record, and when the project is completed it is so indexed in the executive office and reference made to any publication that may have been made. I believe that the introduction of some such a system as this is a valuable thing from the executive point of view, because as our institutions increase in size it becomes more and more difficult for the director to have personal knowledge of work being carried on.

In the early days of experiment station work when there were few men, it was possible for the director to carry all these ideas in his mind.

L. G. CARPENTER, of Colorado. We have found it desirable to take up some such a system as Dean Russell has indicated, and it is working out somewhat along the same line. Definite projects are reported in advance and then records kept.

In addition to attempting to get a perfectly definite statement of the objects of the investigation or project in advance, a definite statement of the method that is proposed to be adopted is desired. Of course these are all subject to changes that may become necessary. In addition to that we attempt to get a definite estimate both of time and money. We have found each of these equally important. The estimate sheet goes into detail as to traveling expenses, as to apparatus, as to printing, and as to the various items that go to make up the estimate. An estimate of time is important because everyone connected with this kind of work knows that many people like to distribute their time over half a dozen projects or investigations without realizing that they do not have ample time to give some particular project the proper investigation.

It seems to me that the relation of the director to the men is one that must vary much. So far as desirable the connection should be almost as loose as is possible for associate work. With good sense and good management almost any system will work under certain conditions, and if not it may be so modified that it will work.

We have had some cases in which when men left the station we found the records were in such shape that nothing could be done with them, and the work they had done was absolutely lost. This has almost forced the keeping of a closer supervision of records. Indeed, I think it is almost necessary for workers

individually and collectively to realize that there must be a sufficient record and continuity in station work even though there may be a change in the men.

In reply to a question H. L. Russell stated that in Wisconsin there was an annual budget, but in the conduct of the university business requisitions were made for six months.

H. J. WHEELER. There is an arrangement in the Rhode Island station by which the head of a department may buy small supplies, five or ten dollars' worth, pay the cash and take a receipt, and be promptly reimbursed. Thus anyone is free at any moment to get any little thing that is needed.

RESEARCH JOURNAL FOR EXPERIMENT STATIONS.

E. DAVENPORT. There has been a good deal of talk for a number of years about the need of a new publication for station results, especially those which emanate from the Adams work. The matter has been before the committee on station organization and policy, and the committee has drawn up a rough outline of a plan (see p. 48).

C. D. WOODS. It may be interesting to know that this matter has been under study by the committee on station organization and policy for now about eighteen months and was taken up last autumn by correspondence with each experiment station for the purpose of getting the views of the stations on various matters relating to the journal or medium of publication. The consensus of opinion of at least two-thirds of the experiment stations is that a medium is necessary, and that if a medium is to be obtained at all it must come by government support and not by contributions of the stations. There is general agreement that there ought to be some such journal or some means of publishing the matter which otherwise would be too technical for our general station publications.

A. C. TRUE. It will be understood that in speaking upon this subject I do not represent the Secretary of Agriculture. What I have done has been merely in the way of aiding the committee to formulate a definite plan for your consideration, which is to be presented to the Secretary of Agriculture with reference to his approval. As far as the general proposition is concerned, however, I may properly say that I am very deeply impressed with the need of a common medium for the publication of the scientific work of the stations, and that is aside entirely from the question of the support or conduct of such a medium, whether it is to be done by private subscription or by contributions from the stations or by a congressional appropriation. At present we have this condition of things: Our station publications, as a whole, are of such a miscellaneous character that they fully satisfy nobody. Most of them are written with the primary purpose of reaching a large and popular audience, and whether they embody scientific work or not, the effort is made to present the material in such a way as will be acceptable and instructive to the layman, especially the farmer. At the same time the scientific workers naturally want to present the matter so that it will be acceptable to scientific men. Thus they have in mind as they write these publications the necessities of a scientific presentation of the subject. The result is that they do neither one thing nor the other, and the material is not put in scientific form or in good popular form.

One result is that most of the station bulletins, even though they claim to contain original work, are so written that it is very difficult to tell what original work was actually done. Some of our stations which present their matter in the most attractive form are subject to that criticism. Scientific men in general have not as high an estimate of the work of our stations as the work warrants. More than that, the scientific world, taking in Europe as well as America, is not able to obtain in any complete way the publications of the

stations under present conditions. Scientific men, therefore, have to content themselves very largely with the presentation of this work through the Experiment Station Record, and that is entirely inadequate and must always be so. If we could have some common medium for the publication of scientific work of the stations so it could be put out in good form and published apart from the mass of popular material and extension work that the stations have to do under present conditions it would, in my judgment, be a great gain in every way. It would raise the scientific reputation and standing of our stations. It would make possible the employment of a higher grade of scientific men in many cases in our stations, since they would find the work much more attractive. On the other hand, the farmer would be better pleased, because if this scientific work was once separated out and the ordinary bulletins of the stations were prepared primarily in simple and untechnical language, undoubtedly the matter would be much better presented for the farmer's use. There is no doubt that a great deal of the influence that the stations might have is lost at present, because their work is put out in such form that the farmer is discouraged in the attempt to find out what the stations actually do which is of real practical significance.

For these reasons briefly stated I think it is very important that this matter should be carefully considered by this association, and I am certain there should be a decided effort to get some common medium for the publication of the scientific work of our stations.

If this matter is favorably considered by the association and by the Secretary of Agriculture in any such form as has been here presented, it will, of course, be necessary to go to Congress for the money with which to print this journal. That will not involve asking for a large appropriation as appropriations go, but I think it will require the united effort of the colleges and stations to secure early favorable consideration of the matter by Congress. That grows out of the fact that at present there is a feeling in Congress that the Government is doing altogether too much printing, and in some respects I agree with that position. It will have to be made clear through the committees and individual members who are to vote upon this matter that this is a very special case; that there is a real need, and that it is a matter of great importance to our agricultural institutions that we should have a proper medium for the presentation of their scientific work.

I am inclined to think that an initial appropriation of \$25,000 or \$30,000 would enable us to start this work and put the scheme in operation. I should expect the amount to grow steadily, but it will take some little time to get this matter well organized and going. The first few years I should expect a rather moderate amount of printing would be required. We would have, of course, to have an editorial office, with a competent scientific man at the head of it as the managing editor, and such clerical assistance and others as he might need.

J. WITHEYCOMBE, of Oregon. There is great need of a scientific journal that represents the results of all this large expenditure of government money. I believe that we can compare as a nation with any country if this work is compiled and properly published.

T. F. HUNT. I wish to ask whether the word "journal" is a fortunate name or term. I think the word "journal" would not be a good term.

C. D. Woods explained that the term "journal" was only tentatively proposed.

A. C. TRUE. I do not think that any great stress should be laid on the term "journal." On the whole, I believe it would be better to have a series of publications so united that it would be possible to issue them with some regularity, keep track of them in a regular way, and have suitable indexes prepared at

reasonable intervals. Perhaps Dean Hunt has in mind the question as to how the individual station can get the particular articles in which it is interested. I do not think that there is any more difficulty about that if the matter is put in the form of a journal than if it is put in the form of monographs. A journal can be prepared so that each station can have a considerable number of copies of individual papers. These separates can be so printed that they can be put out in the form of bulletins by the stations if desired. Personally I do not see any great objection to a journal of agricultural research. This would come to be recognized in the scientific world, and it would be easy to find volume 10 or 20 of this journal, whereas it might not be so easy to find monograph 350.

The proposal of the committee with reference to a research journal for the experiment stations was approved.

OFFICERS OF THE SECTION.

On motion of J. L. Hills, of Vermont, the chair appointed as a committee to nominate officers for the ensuing year, C. E. Thorne, of Ohio; H. L. Russell, of Wisconsin; and L. G. Carpenter, of Colorado. (See p. 121.)

On motion, the section adjourned until 2 o'clock p. m. Thursday, August 19.

AFTERNOON SESSION, THURSDAY, AUGUST 19, 1909.

The chairman called the meeting to order at 2 o'clock p. m.

GENERAL PROBLEMS OF IRRIGATION AND METHODS OF ATTACKING THEM EXPERIMENTALLY.

J. A. Widtsoe, of Utah, read the following paper:

Irrigation studies fall, naturally, into three great divisions: (1) The conservation of the natural precipitation, (2) the conveyance of water to the farms, and (3) the use of water on the farms.

The first division, which deals with the conservation of the natural precipitation, lies largely outside of the field of the experiment stations. Under existing conditions, the stations should not undertake surveys for suitable reservoir sites or the construction of great dams and canals for the storage of the waters that flow from the highlands to the valleys. This work is being well done by the Reclamation Service and many of the western state governments.

One method of conserving the natural precipitation is, however, properly a subject for station research, namely, the storage in the soil, for agricultural purposes, of the rain and snow that falls upon the farms. It is a well-established fact that the natural precipitation over the larger portion of the arid region is not sufficiently great to pass through the deep soils to the distant standing water table. If the natural precipitation could be made to enter these deep soils, it would mean much for western agriculture. In fact, the practice of dry farming rests chiefly upon the conservation of the natural precipitation in the soil. The Utah station has found that it is possible to store in the upper 8 or 10 feet of soil, most of the winter precipitation, that is, the precipitation between harvest and spring seed time. In one season as high as 96 per cent of the total winter precipitation was found in the soil in the spring. It is generally agreed that the amount of irrigation water to be applied to fields should be varied with the amount of water found in the soil in late spring or early summer. In districts otherwise similar where the winter precipitation is only 5 inches, much more water must be used during the irrigation season than where the winter precipitation is 15 or more inches. The amount of the natural precipitation on agricultural lands and the proportion of it that may be stored in the soil will in the end be vitally important in determining the duty of irrigation water. It may be said, safely, that if the winter precipitation over the farms of Utah be properly conserved the irrigated area of the State may be increased one-third without the building of another reservoir or canal. To some degree this principle holds no doubt for many of the other Western States.

The western stations should begin early the study of their respective States with respect to the relations of rainfall, depth of soil, water holding capacities of various soils under field conditions, and the numerous other questions that group themselves naturally about the problem of storing the natural precipitation in the soil. Among other things this will require soil surveys from a new point of view, namely, that of water holding capacity. In passing it may be suggested that in this work the surveys of the Bureau of Soils of this Department may find practical application. Then, after these fundamental surveys have been made more or less extensively, the next great question will concern itself with the best methods of soil treatment for enabling the rains and snows to enter quickly and deeply into the soil, away from the dissipating influence of sunshine and winds. The Utah station has come to advocate for this purpose the general practice of fall plowing and the leaving of the land in the rough condition throughout the fall and winter months, but in other States a different practice may be more effective. After the precipitation has entered the soil, the problem is to keep it there until needed by plants. The stations must, therefore, develop methods whereby water, stored in the soil through the winter months, may be kept there during the warmer months of spring and summer. This done, it must be determined by what means the spring and summer rains may be stored in soils to be of the greatest use in the production of crops. This division of the irrigation problem, which deals with the conservation of the natural precipitation, omitting entirely the construction of reservoirs and dams, offers a field, fascinating and profitable, that may and should occupy students of irrigation and dry farming for some years to come. Ultimately, the work, because of its fundamental nature, must be done. Why not begin it now?

The second division of the general irrigation problem deals with the conveyance of water to the farms. It is likewise of great importance, but in its relation to experiment-station work it partakes more of the engineer's work than does either of the other divisions. The leaky lateral is the cause of great loss of water from the high-lying lands. The water thus lost causes the rise of alkali in the lower valleys. The irrigation investigations of the Office of Experiment Stations have shown repeatedly and emphatically the necessity of devising means for preventing the leaks in canals, their laterals, and farm ditches. One Utah ditch, less than a mile in length, loses by seepage 40 per cent of the water flowing through it. The immense western deposits of various kinds of clay and other cementing materials should make it possible to devise some cheap and effective means for lining the ditches that lead from the canals to the farms. A little systematic experimental work would undoubtedly make it easier for the farmer to maintain his ditches in the most effective condition. Under this division of the general problem must be placed also the work of perfecting and simplifying the methods of measuring the water in irrigation systems. The head gates of the laterals, though gradually improving, are still of the most primitive kind. The water masters, with present means, can make only approximate divisions of the water in the canals under their control. The farmer himself, who should be most vitally interested, seldom has any conception of the actual amount of water that he should receive and the number of acres of land that it should reasonably be made to cover. With him it is very largely a matter of so many "streams," to be used as best he can on his farm, whether it be 40 or 400 acres in area. The evils of over-irrigation are due, in a large part, to the fact that the farmer does not know clearly the actual quantity of water he is receiving and the area of land each unit of water should irrigate. During the last ten or fifteen years few new contrivances for measuring and dividing water have been proposed. It is beyond belief that the best possible devices have been invented. The dearth of new inventions is probably more likely due to the fact that human intelligence has not been directed seriously toward this problem. It is one of the most important for the stations to solve, for the correct use of water can not be expected until rational methods of dividing and measuring water have been devised and popularized. Meanwhile the second division of the irrigation problem, dealing with the conveyance of water to the farms, offers a large and promising field for the investigator who has an agricultural engineering training.

The third division of the irrigation problem deals with the use of water on the farms. Though it can hardly be said to be more important, it is more comprehensive than either of the other two, since it must be attacked with reference, first, to the soils of the farms, and, secondly, to the crops grown on them.

The relation of soils to the proper use of irrigation water is a subject sadly in need of systematic study and which, without question, will yield important results. In all soil studies that connect themselves with irrigation it should be borne in mind that in many respects humid and arid soils are fundamentally different. The movement of water in soils under conditions of irrigation needs to be studied exhaustively, largely for the purpose of determining to what extent the mass of data gathered by students of the movement of soil moisture under humid conditions may safely be applied under conditions prevailing in arid districts. The downward, lateral, and upward movements of soil water are influenced by numerous factors, such as the nature of the soil, the quantity of water applied, the moisture already in the soil, the manner of application—whether surface or subirrigation—and the crop growing on the soil. The value of all such factors should, as far as possible, be determined quantitatively for a variety of type soils. Intimately connected with the question of the movement of soil moisture is that of the factors influencing the loss of water from the soil. Investigations are needed that will show definitely the rate of loss of water under various conditions and for different soils, from bare soils and from soils on which crops are growing. The Utah station has shown that the rate of loss of soil water is strongly affected by the nature and depth of the soil, the hardpan, the gravel streaks, the percentage of water in the soil, the meteorological factors—temperature, relative humidity, sunshine, and showers—the time after irrigation, the condition of the top soil, the method of irrigation, and the kind and age of the crop. Only by the accurate determination for a variety of soils of the value of these factors can really reliable suggestions be made to the farmer concerning the proper methods of conserving the moisture applied to the soils in the form of irrigation water or rain and snow.

Stirring the top soil has long since been demonstrated to be an effective method of diminishing the evaporation from soils, yet little is known about the time after irrigation when cultivation is most useful, and the depth to which it should be practiced on different soil types. In fact, it is not absolutely certain that cultivation will check evaporation from every soil, for in the Utah work one kind has been found which invariably loses more water when cultivated than when left sunbaked. Moreover, evaporation from bare soils may be checked in other ways, as, for instance, by the addition or removal of soluble salts. This invites questions pertaining to alkali and drainage. Other means may undoubtedly also be found. It is certain, however, that by reducing the evaporation of water from the soil, the possible irrigated area may be correspondingly increased, and thus the necessary work of such an investigation is fully justified.

Fully one-half or more of the water lost on a cropped irrigated field is evaporated from the plants by the process of transpiration. It seems that plants can not regulate the amount of water that they take from the soil, but, other conditions being the same, the larger the quantity of water presented to the plant roots, the more is used. In view of this condition any soil treatment that regulates transpiration will be tremendously important. Nearest at hand, in this matter, lies the determination of the optimum percentage of water that should be found in the soil after each irrigation, keeping in mind both the rate of transpiration and that of assimilation. This determination to be of real value should be made with reference to a variety of soils. However, in the study of the regulation of transpiration another field of investigation is opened. Investigators in humid climates have shown repeatedly that the amount of water actually transpired by a plant varies with the composition of the soil itself; that is, the number of pounds of water required for the production of 1 pound of dry matter is increased or diminished, according to the available plant food. In experiments recently completed at the Utah station this principle has been put to the test under irrigated conditions, and it was found that the available soil fertility set free during one season by persistent hoeing reduced largely the amount of water required for each pound of dry matter—in one case nearly 20 per cent—that two or more years of fallowing reduced the water cost of dry matter one-half or more, and that the addition of commercial fertilizers to somewhat infertile soils made it possible to grow crops with very much smaller amounts of water than before. The limits of the application of this leading principle are yet to be determined, but in the West, where water is the limiting factor of crop production, any new method of conserving soil moisture is of very great importance.

The bacterial life of the soil, as affecting fertility, is also strongly influenced by irrigation. The Utah station has attempted to investigate the subject by

studying the production and movement of nitrates in irrigated soils. No very definite results have as yet been obtained beyond the general one that the periodic application of irrigation water does affect definitely the production and distribution of nitrates, and, in all probability, the production of other soluble plant foods. An almost virgin field is opened here.

In view of the relation of available plant food to transpiration, it becomes more important than ever to determine the actual fertilizing value of the constituents of the irrigation water drawn from the chief rivers of the West. The Arizona station is notable for the work it has done on this subject. More should be done, however, in all the arid States. In connection with this phase of the work, it might be well to determine the limits of safety in the use of the numerous saline springs and creeks for irrigation purposes.

When these and other problems concerning the relationship of irrigation water to soils have been attacked and results are being obtained, it will be found necessary to conduct soil surveys for the purpose of enabling the investigators to apply properly the conclusions obtained with type soils to the great variety under cultivation. These surveys must determine primarily the water needs of the soils, and in that respect will be wholly different from the old-fashioned soil surveys.

The work to be done in elucidating the relationship between soils and irrigation water in actual farm practice, as above outlined, leads into a large and mostly untrodden field, where the soil chemists, soil physicists, soil bacteriologists, and the engineers may labor long, from a new point of view, with profit to themselves and the irrigated section. The opportunity to enter a new field should of itself be very attractive to station workers who have hammered away these many years at the inherited, stereotyped problems.

The above-suggested soil studies in behalf of irrigation appear, no doubt, exhaustive and complex, but they are in reality less so than the investigations necessary to determine the relations between plants and water under conditions of irrigation. The yield of crops is of first importance to the farmer. It depends upon many factors, especially the total quantity of water used, the time of application, the frequency of application, and the manner of application. In general, it has been found that with little irrigation water much more grain, potatoes, sugar beets, or other crops is produced per inch than with larger quantities of water. In fact, the crop-producing value of water appears to diminish up to a definite limit; the addition of water beyond this limit causes in many cases an actual diminution of crop yield. Naturally, this is of fundamental importance in all irrigated sections, and should be given thorough investigation for all classes of soils and crops. The results obtained during the last nine years of irrigation study at the Utah station show clearly that in Utah, and undoubtedly in all the Western States, entirely too much water is used for the production of crops. A more moderate use of water, according to the findings of the experiments already conducted, would double or treble, or perhaps quadruple, the irrigated area without adding to the amount of water already stored in reservoirs and carried by canals.

The total yield of the crop is not alone affected by irrigation; the manner of growth is likewise influenced. For instance, the time of maturing may be delayed or hastened, which is well worth considering in many places where earliness or lateness determines success or failure. The relative proportions of plant parts—leaves, stems, roots, and seeds—may also be varied. In the production of wheat and other plants the seed of which is of a high value and the straw of little value, any method that will enable the farmer to increase the grain at the expense of the straw has a distinct economic value. The rate of growth of a plant, the development of its root system, and its general manner of growth are strongly influenced by irrigation. The problems of fall irrigation and the utilization of the early spring floods must be studied with reference not only to the effect upon the yield, but upon the general growth of the crop.

Next to the crop yield stands in importance, no doubt, crop quality as it is affected by irrigation. It is now well understood that the composition of plants may be varied at will, within limits yet to be defined, by varying the amount or method of irrigation. Some seven years ago the Utah station found that by regulating the amount of water applied to wheat on a certain shallow soil the protein in the grain was raised from about 15 to 26 per cent. This very large variation can, in all probability, be accomplished only under unusual soil conditions, but it shows as an extreme case the possibilities of affecting the composition of plants by irrigation. It has been stated as a law that the protein

increases as the amount of irrigation water decreases. In the study of the relation of season to grain composition this has been substantiated by many stations in all parts of the country, as evidenced in many recent bulletins. It has also been observed that sugar and starch in potatoes and sugar beets increase with increasing amounts of irrigation water and decrease with decreasing irrigation. The composition of all plant parts appears to be affected by changing irrigations. With the power of varying at will, within considerable limits, the composition of the crops produced, it should be possible for the western farmer to enter the markets with a new vigor and in successful competition with any district which does not possess the control furnished by irrigation. The coming tendency is to value foods, both for man and beast, more and more on the basis of quality. As that tendency becomes crystallized into practice the immense value to the irrigation farmer of being able to regulate, in a measure, the composition of his crops will become more evident.

In connection with the subject of the quality of irrigated crops much work needs to be done. For instance, it is not sufficient to say that wheat grown with little water is rich in protein. It must be determined, also, to what extent this difference enters into the flour made from the grains. At the Utah station a mill was installed for this purpose some six years ago, and the results already obtained are of great importance. Similarly, potatoes, carrots, cabbages, and other vegetables grown with various amounts of water should be tested for their cooking value. This would bring into service the domestic-science departments as cooperative workers in an exhaustive and scientific scheme of irrigation investigations. Still further, the plant chemist should probe into the very heart of the chemical constituents of the plants and their parts to learn whether under varying conditions of irrigation the chemical nature of the individuals roughly classed as protein, sugars, starches, and fats, is changed. To carry the work to its logical end feeding experiments should be instituted for the purpose of comparing the value of crops produced under the various methods of irrigation and with different amounts of water. It appears less important for the western stations to determine the feeding value of each kind of crop, which is being done so well by stations in other parts of the United States, than to establish the feeding value of the same crops grown under various conditions of irrigation.

Since it has been observed that the nature and growth of plants, the percentage of seeds, leaves, and stalks, and the quality itself are influenced by irrigation, the question has been repeatedly raised whether or not it is possible to breed into plants by continual growing under irrigated conditions certain definite characteristics. Whether this can be done is doubtful, but it is certainly worthy of careful investigation and opens an interesting field for the student of plant breeding.

As for the actual apparatus to be used in irrigation investigations, in Utah the main dependence has been placed upon carefully flumed farms upon which accurately measured amounts of water can be applied. To check against the results obtained on these farms a vegetation house has been employed in which pots containing different soils have been subjected to treatments very much like those given the plats in the experimental field. Further, to check against the results obtained from the flumed farms and the vegetation house, experimental farms have been established for one or two seasons in numerous places throughout the State and upon which accurately measured amounts of water could be applied. It has been a source of gratification to note the degree to which the conclusions drawn from the work on the experimental plats were corroborated by the results obtained on the larger temporary farms under new conditions in various parts of the State. Then, back of the field work have been the steady help of the laboratory workers in the chemical, physical, and bacteriological laboratories. In the pursuit of the investigations it has been necessary from time to time to devise new apparatus, and this has been one of the most difficult tasks. I confess freely that at the Utah station we have succeeded in doing only in part what our plans contemplated some ten years ago. However, enough has been done to justify us in the belief that it would be extremely profitable to the stations and to the West to have such investigations conducted on a larger and cooperative scale.

The thing that most impresses a student of irrigation is the fact that irrigation investigations require the united effort of men of a variety of training. The irrigation engineer can do only a part of the work, though in the past it has been the custom to delegate all irrigation investigations to him. The

expert student of soils is equally important. The chemist can not be dispensed with. As the influence of irrigation on the bacterial life in the soil becomes more fully understood, the bacteriologist will be in greater demand. The plant physiologist will be required to illuminate obscure corners in the theory of transpiration and the transference and use of water within the plant. The soil physicist will be taxed to devise methods and execute surveys of the soils to be irrigated. As the work progresses other fields of investigation will come into view, and workers in other departments of science will be invited to join in the pursuit. The solution of these important irrigation problems seems, therefore, to depend primarily upon the united effort of many workers in many stations. I am not advising the organization of any more scientific associations, but it certainly would be helpful if the stations interested should call a conference, preferably under the supervision of the Office of Experiment Stations, for the purpose of discussing the great irrigation problem and laying plans whereby the work can be undertaken in good earnest. It may not be wise for any one station to attempt all the phases of the investigation. It may be better if a division of the work is made among the various stations, yet that also is a matter for discussion. I fear that until the stations unite to solve the problems of irrigation we shall make slow headway, and will not be able to keep pace with the demands made upon us as the new irrigation projects are completed by the federal and state governments and by private enterprise.

Changed conditions have brought the nation into competition with the world. The nation itself is placing more and more of its agricultural burdens upon the West. The value, as a national asset, of the deep fertile soils of the West, and the unequalled power possessed by the farmer who controls at will water, one of the four great factors of plant production, is being more clearly appreciated. Slowly, but surely the population is moving westward. The experiment stations should anticipate the future and no longer hesitate to devote a larger amount of energy and money to the elucidation of the principles underlying the ancient art of irrigation. In the attempt to establish a science of irrigation important discoveries will be made, which will benefit the whole country, and both the East and the West will say that the expenditure of time and money and human energy has been well justified.

The CHAIRMAN. In this connection I might say that in the humid regions where we formerly thought irrigation was unnecessary we find it exceedingly profitable, and these problems here being worked out so successfully in the arid region will be of great value there.

D. W. MAY, of Porto Rico. Has an investigation been made of the effect of irrigation on the bacteriological content of the soil?

J. A. WIDTSON. I am hardly qualified to answer that question. We find that nitrates go down in the soil and come up again as the soil water goes down and up. When water is applied to the soil bacterial activity is influenced to a certain extent.

F. B. LINFIELD, of Montana. In observations upon dry farming we have found that there is a very close relation between the water supply in the soil and the nitrate content. In dry soil there is very little nitrate.

In reply to a question, J. A. Widtson stated that in the tests at the Utah station it was found in every case that by the addition of fertilizers to infertile soil the amount of water required for one pound of dry matter was greatly diminished. On the fertile soil the effect was not so clear. But the most interesting feature of the investigation was that by letting the soil lie fallow two or three years there was a corresponding diminution of the amount of water required for crop production.

The secretary read the following paper by E. T. Tannatt, of Montana:

IRRIGATION INVESTIGATIONS.

The investigations of the Montana Experiment Station along the lines of irrigation practice have, for the past four or five years, been conducted with the object of eliminating some of the more important difficulties encountered by the

irrigator, especially in districts where water is not secured in sufficient quantities to furnish an abundant supply at all times.

The laws of Montana rightly limit rights to "beneficial use," and it is upon that law as a basis that the station has been working, believing that "beneficial use" should apply with equal right to the transporting of the water supply, as to its actual distribution on the fields.

When the streams furnish an abundant water supply for all purposes it is oftentimes difficult and well-nigh impossible to make a community take an interest in the proper and economical use of the supply; but when the water is scarce or has to be pumped, the station has found more ready assistance and a greater willingness to profit by the advice given.

There are, we believe, a very large number of problems presented to the irrigator and the irrigation engineer which deserve careful consideration. Some of these problems will be solved by the farmers themselves in due course of time; and improvement will be made only after attending the school of practical experience, while others will require experimental research work, unless we are content to continue expending money along the same careless lines, which have so often resulted in financial losses and failures of the irrigation companies of the West.

In the early days of irrigation practice the canals and ditches were largely located and constructed without a thought as to grade or velocity, seemingly the only object being to deliver the water to the land as quickly and easily as possible. Practical experience has since demonstrated the fallacy of these methods, until at the present day an experienced engineer is employed on most of the irrigation projects.

The station, therefore, believed it right and best to investigate such problems as were considered of the most vital importance to the irrigator and State in general. We recognized that at the present time a considerable portion of the irrigated sections of Montana were suffering from an excess of water deposited in the subsoil during the irrigation season.

This could be avoided in a measure, by the proper application to the fields of irrigation waters. But we early recognized that we would encounter two great difficulties in teaching this to the farmers of the State: First, the practical irrigator has yet to learn to give the technically trained man much consideration in such matters. The practical irrigator looks at this question as he would in buying feed for his horses, namely, he must get as much for his money as possible, and if he has a greater supply than he can properly use, he can afford to waste it, as he has paid for it. He looks upon his water supply, "If a little water is a good thing, more of it is better."

To demonstrate that a less supply of water will produce better crops carries little weight, as he will credit the result, if demonstrated, to soil cultivation or weather rather than proper regulation of the water supply.

Further difficulty was also presented, as we knew that but part of the seepage difficulties could be charged to the excessive use of irrigation waters upon the fields and that, even after we had taught the proper duty of water and the farmers had followed our teachings, we would yet have a considerable portion of the difficulty not provided for.

In teaching the duty of water the station recognized that, in addition to the prejudice which the practical irrigator seems to hold against the technically trained man, the human element entered the consideration, in an effort to try and get all you can for the money. We therefore came to the conclusion that we could best teach the proper use of water by making clear to the irrigator the folly of excessive use of water and the damage due therefrom. We also recognized that not only the irrigator but the canal companies were to a very large extent equally subject to criticism, and if we were to obtain the best results for the State we must "hew true to the line" and treat the canal companies and the farmers with equal justice.

Our irrigation investigations for the past four years have, therefore, been along the lines of seepage and drainage, and we have found that not only are there lessons for the farmers and canal companies to learn, but that the irrigation engineer has many points he can study to good advantage.

In our seepage investigations we early demonstrated that the larger percentage of difficulties arising from subirrigation was chargeable to the canal companies and the owners of ditches.

Canals and ditches in the several parts of the State were investigated and their seepage losses varied from as low as one-half of 1 per cent per mile to as

high as 34 per cent per mile of the water entering the canals. These records were not taken from new canals and ditches, but from those which had been in use for from five to forty years.

From one system alone we found more than 50 per cent of the entire supply lost before reaching the lands to be irrigated. Fortunately these cases of excessive seepage losses apply to sections in the several canals; if it were not the case our canals would all be excessively short.

We are not able to harmonize the thought of "beneficial use" with the usual method of trying to convey the waters to the lands through canals and ditches constructed in gravel with the velocities so high as to absolutely prevent the deposit of silt, as also to erode the soil itself.

In many parts of the irrigated sections of the West and, in fact, in nearly every irrigated section, we observe tracts of once valuable agricultural lands rendered valueless through subirrigation and the consequent deposit of alkali. In many of the valleys of Montana this damaged land covers areas thousands of acres in extent.

Various publications upon the subject have been published in accusing the farmers of wasteful extravagance in the use of water; and the author has met representatives of some of the larger canal companies, who, pointing to some submerged tract, remarked: "It is strange that these farmers can not be made to realize the damage they cause to their properties by such wasteful use of water." Some years since, and after investigating conditions, we became convinced that it was necessary to learn more of the true cause of the difficulty and, in addition to a study of the methods for applying water to the lands, investigated the losses from the canals of several of the valleys. In one canal, about 20 miles in length, we found an actual seepage loss of 20.3 second-feet. As this canal is one of the oldest and best constructed in the State, in all probability the losses above recorded are close to a minimum as compared with other newer and more poorly constructed canals. It may be difficult for some to realize just what volume of water 20.3 second-feet of seepage represents. In order to assist in this matter, we will suppose that it were possible to collect all of this seepage into one channel and to deliver it into one reservoir without evaporation. If we consider the area of the floor of our reservoir as covering 100 acres and that the side walls of the reservoir were vertical, this amount of water would, in one year's time, fill the reservoir to a depth of 147 feet. In other words, we would have filled a reservoir 2,087 feet square and over 147 feet deep.

If we consider only the irrigation season of three months, and made a like reservoir to cover 10 acres, we would yet fill this smaller reservoir to a depth of 367.5 feet. And with all we must keep in mind that the above figures must (even under the most favorable conditions) represent the minimum seepage loss from this canal; for, if we could eliminate the drainage effect from the canal, the seepage losses would exceed the 20.3 second-feet by an unknown and possibly large amount.

It may be of interest to note that these losses, if they could be avoided, would represent a gain to the company (taking the value of the water as low as we have been able to learn of its sale in the State, \$2 per inch per season) of \$1,626, being equal to an investment of \$20,325 with interest at 8 per cent. It is also evident that it would be impossible to save absolutely all of the water included in the seepage losses. From another canal, some 16 miles in length, and which received a considerable subsurface inflow from stream crossings, we found a seepage loss of 32½ second-feet. In another canal, 10 miles in length and in the same district, and subject to even greater subsurface inflow, we found a seepage loss of 55½ second-feet. The losses from the two canals during one hundred days of the irrigation period furnished a volume of water capable of filling to depth of 7 feet a reservoir 2 miles square. These figures, we know, neither represent the total seepage loss from the two canals, nor the total seepage losses from the irrigation system, and yet it is capable of submerging to a depth of 7 feet over 2,500 acres of land.

The question which at once confronts the engineer is, How shall we remedy the difficulty? Like all other ills, we must first learn the cause and locate the seat of the difficulty before a remedy can be intelligently applied, and in this we find ourselves lacking proper information. We examine our reference books and reports and invariably we are advised that the average seepage loss in canals is such and such a per cent per mile. We realize fully that the seepage losses in gravel are greater than in clay, and yet little or no mention is made

of the fact in our publications. We advise our farmers and canal owners to puddle or cement-line their canals, and we are not able to intelligently advise at just what point or how far we must carry this work before it ceases to give proper financial return. We are lacking at the present time reliable data relative to the seepage losses from canals constructed of the various materials and the effect of age in reducing these losses under varying velocities. With proper information along these lines the irrigation engineer could intelligently and economically provide against seepage losses at the time of construction. The farmer or canal owner could ascertain within a reasonable degree of accuracy where it would pay to expend labor in making the ditch or canal more water-tight than provided by the materials with which the canal is constructed. Tables of such a character would be of value not only to the engineer but to the canal owner and irrigator, especially if we supplemented the same with a table showing the volume of the losses in terms which could be appreciated by the laymen. The term "second-foot" or "cubic feet per second" carries little information as to quantity when read by the average person, while the term "miner's inch" is even more indefinite.

The author recognizes in seepage losses what he believes to be one of the greatest menaces to the successful future of the irrigated interests, and is of the opinion that little good will result in attempting to correct the difficulty through teaching "duty of water." The state laws which limit the water rights to beneficial use are steps in the right direction, and should be supplemented by other laws penalizing canal companies and ditch owners when excessive seepage losses occur in canals and ditches. To properly make such a law effective, we must know more of the actual seepage losses in the several classes of materials. The author has found in his investigations canals to which could properly be charged a very large amount of damage to lands below on account of seepage, and yet these same canals actually carried a greater volume of water 15 miles below than at the headgates. These canals, while subject to heavy seepage losses, were serving as drains for irrigated lands above.

In one case in particular, we found 97 second-feet of water entering the headgates, while 15 miles below a flow of 135 second-feet was recorded. A law penalizing seepage losses would have been inoperative against this canal unless the canal was specially examined.

From the engineering irrigation investigations conducted by the experiment station, the author is of the opinion that far greater general good would result if we confined our studies less to the farmer himself and more closely to the conditions surrounding him and then made these conditions the object-lesson from which we are to teach.

To hold the farmer responsible for the great damage done to submerged lands and to say nothing about the losses from canals is bound to cause the farmer to distrust either our intelligence or honesty. The average farmer will give little credence to the person who demonstrates that he is not thoroughly posted in his specialty, or to the person who fears to state the facts, lest they affect the interests of some company or corporation.

J. D. TOWAR, of Wyoming. There is one point that has not been discussed in connection with these two papers which impresses me very forcibly, and that is the point that Doctor Widtsoe hinted at as to the formation of perhaps another society for the promotion of irrigation science. I believe that in view of the many problems that we have in the States where irrigation is practiced there is a real need for the irrigation engineers, directors of experiment stations, and others to get together and form, perhaps, a section of this association or form a new association for the studying and working out of these various problems. The paper that Doctor Widtsoe has given us has outlined a large number of important experiments, and no institution in the West is capable of taking up all of these. It seems to me that by the stations getting together some of this field could be divided up and some very important scientific work carried on, particularly under the Adams fund. I want to throw out this special suggestion. It seems to me it is something we ought to materialize in the near future.

F. B. LINFIELD. I have been thinking about this question of irrigation a great deal during the sixteen years that I have lived in this western country. I agree

with Doctor Widtsoe on one point, viz, that in our experimental work we have been considering this matter of irrigation in many places from the wrong standpoint. In other words, there are two distinct fields. The one is the field of the engineer, the other is the field of the man who has had his educational foundation in biology, chemistry, and agricultural practice. One is the question of getting water to the land and the other is applying the water to the land. The one is making available the stored water supply; the other is using water to grow crops. There seems to me, therefore, to be some need for re-organization of our methods of attacking this problem. In our work we are considering the application of water to the land as an agricultural problem, but associated with the chemist and the biologist. It is the question of the relation of water to the soil and the crop. The other question is one of engineering construction, of getting water to the land and preventing or correcting evils that come from its excessive use. This requires not a biological or chemical, but an engineering training. In the past we have been trying to combine both of these lines of work, and I have sometimes questioned whether we have made the progress we should had we had another point of view.

In my studies in the East the all important question in crop production was soil fertility. My observation and experiences in the West has led me to give the superior consideration to the water supply. This is not because soil fertility is not important, but because the availability of the soil fertility depends upon the water supply. In the dry country a water supply we must have, for without a water supply we can not use the fertility. In our investigations on the dry farms in Montana we have obtained more bushels of grain from two crops grown in alternate years than we have got from four crops grown continuously on the land. We have tried to find an explanation for this, and our studies have led us to believe that the size of the crop depends mainly upon two things. First, the available water supply, and, second, the available fertility. But on the dry land if we do not give special attention to preserving the water supply in the soil and so making conditions favorable to the bacterial growth, and to the chemical changes in the soil, there is no preparation of the plant food and the result is much reduced yields.

ELECTION OF OFFICERS OF THE SECTION AND MEMBERS OF THE EXECUTIVE COMMITTEE.

The committee on nominations being absent, after a brief session of the section as a committee of the whole, the secretary announced the selection by the committee of the following officers for the ensuing year: For chairman of the section, F. B. Linfield, of Montana; secretary, H. L. Russell, of Wisconsin; members of the executive committee, W. H. Jordan, of New York, and C. F. Curtiss, of Iowa; additional member of the program committee, W. H. Beal, of Washington, D. C.

The section then adjourned sine die.

[Bull. 228]

INDEX OF NAMES.

- Adams, C. F., 9.
 Armsby, H. P., 8, 24.
 Atwell, H. C., 10.
 Avery, S., 7, 9, 46, 99.
 Avery, Mrs. S., 9.
 Ayres, B., 8, 25, 46.
 Bailey, L. H., 9, 22, 25, 43, 73, 84.
 Ball, E. D., 10.
 Beal, W. H., 7, 10, 46, 121.
 Beattie, R. K., 10.
 Bexell, J. A., 10.
 Bradley, C. E., 10.
 Bridwell, J. C., 10.
 Brooks, W. P., 7, 9, 46.
 Bryan, E. A., 10, 20, 21, 24, 45, 57, 64, 70, 71, 99.
 Buckham, M. H., 8, 25.
 Burnett, E. A., 8, 9, 20, 46, 87.
 Burnett, Mrs. E. A., 9.
 Burr, C. G., 10.
 Butterfield, K. L., 8, 9, 22, 34, 46, 64, 71, 72, 76, 78, 79.
 Butterfield, Mrs. K. L., 9.
 Carpenter, L. G., 8, 9, 32, 46, 109, 112.
 Christie, G. I., 7, 9, 46, 74.
 Cole, G. A., 9.
 Collamore, Miss L., 10.
 Connell, J. H., 10, 77.
 Cordley, A. B., 10, 21, 97.
 Craig, J., 9, 108.
 Curtiss, C. F., 7, 8, 9, 20, 39, 46, 75, 121.
 Davenport, E., 8, 9, 16, 21, 24, 41, 45, 47, 49, 72, 78, 93,
 100, 106, 107, 108, 110.
 Davenport, Mrs. E., 9.
 Davenport, Miss M., 9.
 Davisson, A. E., 9.
 Demarest, W. H. S., 9.
 Dodson, W. R., 9.
 Doten, S. B., 9.
 Dryden, J., 10.
 Duggar, J. F., 8, 40, 46.
 Duncan, D. I., 9.
 Dyott, D., 15.
 Edwards, H., 8, 10, 24, 25, 39, 43, 64, 70.
 Ellett, W. B., 10.
 Elliott, E. E., 9.
 Elliott, J. C., 10.
 Ellsworth, J. L., 9.
 Farrington, E. H., 10.
 Fellows, G. E., 9, 72.
 Fitterer, J. C., 10.
 Foster, L., 7, 9, 46.
 Foster, Mrs. L. C., 9.
 Frandson, J. H., 9.
 French, H. T., 9, 40.
 Garman, H., 9.
 Garrison, W. E., 9.
 Gibbs, W. D., 7, 9, 46, 99.
 Gigault, G. A., 10.
 Gillette, C. P., 9.
 Goss, A., 9.
 Graham, C. K., 10.
 Graham, Mrs. C. K., 10.
 Green, Miss J., 10.
 Greisen, C. R., 10.
 Hamilton, J., 10.
 Hanson, L. W., 10.
 Hardy, J. C., 9, 51, 71.
 Hart, W. R., 9.
 Hays, W. M., 39.
 Hayward, H., 9.
 Headden, W. P., 9.
 Henry, W. A., 41.
 Herff, B. von, 9.
 Hills, Miss B., 10.
 Hills, J. L., 7, 10, 15, 46, 76, 106, 112.
 Hughes, A. G., 9.
 Hunt, Miss M. J., 10.
 Hunt, T. F., 8, 10, 19, 40, 43, 107, 111.
 Hunt, Mrs. T. F., 10.
 Hutchinson, W. L., 9.
 Hyslop, R. E., 9.
 Jordan, W. H., 7, 9, 46, 121.
 Kaufman, E. E., 9.
 Kent, F. L., 10.
 Kerr, W. J., 7, 10, 15, 24, 32, 42, 43, 46, 51.
 Keyser, V., 9.
 Ladd, E. F., 9.
 Ladd, Mrs. E. F., 9.
 Latta, W. C., 8, 9, 39, 77.
 Lewis, C. I., 10.
 Linfield, F. B., 7, 9, 46, 117, 120, 121.
 Lory, C. A., 7, 9, 46.
 Lyman, E. R., 10.
 McDermut, W. E., 9.
 McHatton, T. H., 9.
 MacLean, J. A., 9, 23, 43, 44, 99.
 Mahone, L. D., 10.
 Martin, W. A., 9.
 Mason, C. D., 9.
 May, D. W., 10, 117.
 Melander, A. L., 10.
 Merica, C. O., 10.
 Merrill, L. A., 10.
 Miller, T. E., 10.
 Mumford, F. B., 9.
 Nelson, S. B., 10.
 Nichols, E. R., 9.
 Nichols, Mrs. E. R., 9.
 Norton, A. A., 9.

- Olsen, J. W., 9.
 Olson, O. M., 10.
 Pearson, R. A., 9.
 Price, H. C., 10, 19.
 Price, H. L., 10.
 Putnam, G. A., 10.
 Rane, F. W., 9.
 Reynolds, L. T., 10.
 Rolfs, P. H., 7, 9, 46, 100, 117.
 Rosbrook, C. J., 9.
 Russell, H. L., 7, 10, 46, 74, 106, 108, 110, 112, 121.
 Scovell, M. A., 8, 15, 46.
 Scudder, H. D., 10.
 Selby, A. D., 10, 103.
 Severance, G., 10.
 Shaw, R. S., 9.
 Shepard, E. A., 10.
 Shinn, J. R., 9.
 Silvester, R. W., 9, 16, 71.
 Skinner, J. H., 9.
 Smith, E. A., 10.
 Smith, H. W., 9.
 Snyder, J. L., 7, 9, 20, 21, 46, 65, 77, 79, 99.
 Soule, A. M., 7, 8, 9, 39, 46.
 Stewart, A. W., 9.
 Stone, W. E., 7, 8, 9, 15, 40, 45, 46, 64, 68, 75, 99.
 Storms, A. B., 9, 20, 22, 24, 45, 51, 64, 71.
 Stubbs, J. E., 9.
 Tannatt, E. T., 117.
 Tarter, H. V., 10.
 Tausch, E., 10.
 Thatcher, R. W., 10, 107.
 Thompson, C. D., 10.
 Thompson, W. O., 7, 8, 15, 25, 46, 99.
 Thornber, J. J., 9.
 Thornber, W. S., 10.
 Thorne, C. E., 10, 48, 76, 112.
 Tillman, J. N., 9.
 Towar, J. D., 10, 120.
 Tracy, S. M., 9.
 True, A. C., 7, 8, 10, 16, 17, 19, 23, 40, 46, 49, 108, 110, 111.
 Twight, E. H., 9.
 Umberger, H., 10.
 Van Hise, C. R., 8, 39.
 Van Hook, F. P., 9.
 Volck, W. H., 9.
 Voorhees, E. B., 8.
 Waters, H. J., 7, 8, 9, 42, 46, 80.
 Webster, E. H., 9.
 Wheeler, H. J., 8, 10, 43, 48, 105, 106, 107, 110.
 Wheeler, Mrs. H. J., 10.
 White, H. C., 8, 40.
 Wickson, E. J., 9, 21, 94.
 Widstoe, J. A., 10, 112, 117.
 Wiseman, J., 10.
 Withycombe, J., 10, 111.
 Withycombe, R., 10.
 Woods, C. D., 8, 9, 22, 24, 48, 110, 111.
 Woodworth, C. W., 9.
 Working, D. W., 10, 64, 69, 74.
 Worst, J. H., 9, 97.
 Worst, Mrs. J. H., 9.

[Bull. 228]